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COSMETOLOGY

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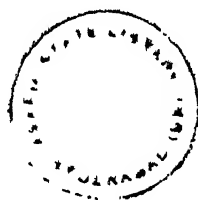
COSMETOLOGY

By REUBEN ROCKWOOD

Co-author of Modern Beauty Culture

And IRENE RUDDOCK

*Writer and Lecturer on Cosmetology
in High Schools and Beauty Culture
Schools*



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PREFACE

The purpose of this book is to present a balanced text that will cover the subject of cosmetology, its related sciences, and its manipulative practices, for both teachers and students, and at the same time fulfill the requirements of courses in vocational education and enable the student to answer State Board questions.

The authors have endeavored to set forth their material so comprehensively that teachers, students, and practicing operators may benefit from the experience and knowledge of authorities in all the branches of cosmetology.

The reliable information and carefully planned and detailed procedures for the various manipulative practices make this book unique in the textbook field.

As a book of reference, it should be invaluable to both the recent graduate and to the operator long out of beauty school who wish to meet completely the modern demands of their vocation.

The material has been compiled with such painstaking care that it should prove to be truly an encyclopedia of knowledge for student and operator alike, and will be an essential addition to public, school, and beauty shop libraries.

In the organization of this textbook, the subjects of anatomy, sterilization and sanitation, chemistry, and electricity have been presented in separate chapters, but it is not the purpose of the authors to imply that these subjects, called "related sciences," should be taught as separate units unrelated to the performance of the practical manipulative procedures of cosmetology. The organization of material for a textbook and the teaching of its contents are two different things.

This book is intended to give the student all the known information relating directly to the job that is being performed. However, to repeat in each chapter of the book the many essential details included in the chapters on the cells and tissues, the skeletal, muscular, nervous, and circulatory

systems, the structure of the skin, hair, and nails and their abnormal conditions and diseases, the fundamentals of sterilization and sanitation, chemistry, and electricity in *each* chapter of the manipulative practices (nearly all of these subjects are "related information" affecting every procedure) would be unwarranted repetition. The student must learn to refer to the chapters containing this related information and to apply her factual knowledge in performing the actual procedure.

The facts presented herein are the minimum prevailing in most states for license examinations.

State Board *written* examination questions are, usually, divided into groups, such as Anatomy, Sterilization, Chemistry, Electricity, Haircutting, Permanent Waving, and so forth, and the answers to these questions are given simply and authoritatively in this book.

State Board examinations in the manipulative practices usually require a student's performing the actual procedure of cosmetology and answering *oral* questions pertaining to sterilization, anatomy, and so forth, as they relate directly or indirectly to the procedure being performed. For instance, in giving a facial, a student must have the ability to prepare the patron, perform the procedure, and answer the oral questions of a State Board Examiner relating to bones, muscles, nerves, arteries, and veins of the body structure upon which she is working, and also questions on sterilization, diseases, chemistry, and electricity as they pertain to the protection of the patron and to the giving of a scientific facial.

This type of examination is in general use, and it is, therefore, necessary that the student study the contents of this textbook in order to be prepared to answer questions both in written form and orally when performing an operation or procedure.

The authors wish to thank Hazel Mae Don, Instructor of Cosmetology, Oakland Vocational School, Oakland, California, for valuable suggestions and for reading and correcting parts of the manuscript, and Grace Van Voorhis for the line drawings of the manipulative practices.

R. R.
I. R.

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COSMETOLOGY

Chapter I

SHOP DEPARTMENT

Your *department* in the beauty shop where you are employed means your conduct, your behavior, your bearing, and your manner toward your employer, your patrons, your fellow operators, and your shop.

Your employer has given you your job. You have been chosen over perhaps thousands of other operators for your efficiency, your agreeable personality, your honesty, and your loyalty to your employer and her interests. Hold your employer and her shop in high regard, and you will make a favorable impression on your patrons. Honesty and strict truthfulness will give you an advantage over less conscientious fellow operators. One small evasion, one half-truth, may never be erased from the memory of your employer.

Perform all disagreeable tasks willingly. Perhaps you will be asked to serve a patron who is hard to please and unappreciative of your best efforts. Give the service efficiently, realizing that every service adds to your employer's profit and to her ability to reward you further and keep you at work.

Respect your patrons. They make your dreams of success in cosmetology come true. When a patron comes to you for a beauty service, she wants to have her appearance improved generally. She expects you to accomplish a miracle. Give careful thought to an analysis of her needs, and adapt your service to her special problem. There will be nothing in the booth to engage her attention, and she will be alert and aware of everything you do and your way of doing it. The manner in which you hang up her coat and hat, take the hairpins from her hair, and adjust the shampoo cape will register in her mind with approval, criticism, or comparison with the way things are done in other shops.

Do not answer your patron's questions evasively or hesitatingly. Be informed of all the details of your business, for how can a patron have confidence in you if you cannot discuss your services intelligently? Pronounce words correctly and do not use slang phrases. Never be flippanant or personal; people resent familiarity from those whom they meet in business. If you are too effusive, your patron may doubt your sincerity. Be cheerful and friendly, but dignified and business-like. Give your patrons the best services of which you are capable. This kind of shop deportment will make the difference between transient patrons and regular ones.

Respect your fellow operators. Complete, wholehearted co-operation of the entire staff is required if the business that gives you your job is to be a success. By your shop deportment you contribute to the harmony or discord of the day's work. Be kind and not critical. Have a good word to say of every member of the staff. Idle conversation during business hours is weakness and waste of your employer's time. Study cosmetology during your spare moments; discuss its problems with your fellow operators. Serve as an example to them by your desire to co-operate in a friendly spirit. Adapt your behavior to the needs of the shop as a whole.

Building Good Will

The greatest asset of your shop is known as the "good will" of the public. It is your duty and responsibility to build up this good will. You are a personal representative of your business, and your every word and act has the power to build or destroy good will toward it, and toward your employer and yourself. You must show honesty, courtesy, tact, and sincerity in every contact you make. Keep up to date; there will always be something new to learn. Search for new ideas; adopt new methods if they improve your work. When a patron returns for a service and asks for you, it is a compliment, an indication that by your deportment you have added to the good will of the public toward your shop.

When a patron enters your shop, she has come because of a previous satisfactory service, because of your shop's adver-

tising, or on the recommendation of another patron. She has come to buy services or merchandise, perhaps both; she is in a buying mood. Approach her quickly and smilingly, as though eager to serve her. Address her by name if she is a regular customer; she will appreciate the compliment. Show a genuine interest in her needs. If you are busy with another patron, show by a smile that you are aware of her presence; tell her that you will serve her as soon as possible. Never leave one patron to attend to a later arrival. *Serve each patron directly, and in turn.*

The tone and quality of your voice over the telephone, as well as your selection of words, will convey an impression of the shop as a whole. Your voice should be well modulated. Speak into the mouthpiece; do not make your listener strain to understand what you are saying. Make sure that you take down the time of appointment correctly. Mistakes made in making appointments destroy good will for your shop. Check yourself; always be sure. If you are telephoning a patron about a special service, write down the exact words you wish to say. Your telephone deportment is as important as any other phase of your work.

Personal Hygiene

You represent beauty; therefore, you must be an example of beauty and loveliness. Cleanliness is beauty's first essential. Lay down for yourself strict rules of personal hygiene. The feeling of being clean, of neatness and grooming, will give you confidence in yourself and will enable you to do better work.

Do not offend your patron by body odors and garment odors. Watch out for underarm odors especially; inspect the linings of your shoes; and keep your locker aired and in a sanitary condition. Use a mouth wash to avoid unpleasant breath. Do not chew gum in the presence of a patron.

As an example of beauty and loveliness, you cannot neglect your daily bath, your daily fresh stockings and undergarments, your weekly shampoos, and your regular manicures.

A crisp uniform, a modern and becoming hairdress, correct fingertips, proper make-up, and strict observance of all the rules of personal hygiene testify to your understanding of this important part of shop deportment.

Chapter II

SELLING BEAUTY CULTURE SERVICES AND SHOP MERCHANDISE

"Salesmanship is getting the customer's viewpoint and then making him see yours, by getting him to think as you think, feel as you feel, and act the way you want him to act."¹

For you who are preparing to become a beauty operator, salesmanship is as important a subject as any one of the anatomy and other related subjects necessary to the practice of cosmetology discussed in the following chapters of this book. The beauty operator's function is a selling function, for beauty services are a valuable commodity with as many selling points as any merchandise.

Selling Beauty Services

A patron returns to a beauty shop where she has received satisfactory services from courteous and efficient operators. Every beauty service you sell gives you an opportunity to create an impression; whether this impression will be favorable or unfavorable rests with you.

While serving a patron, you must not only talk beauty, but you must also think beauty—your patron's beauty. The texture of her skin, the health and beauty of her hair, and the contour of her fingernails are the most important subjects in the world to her, for the moment at least. Every detail of her appearance is also important to you. Keep her name in your card index; put down all the details of the services you have given her and her preferences. If she has

¹ Ivey, Paul W., *Successful Salesmanship*. New York: Prentice-Hall, Inc., 1937, page 19.

made suggestions as to the method of performing the services she requires, put these suggestions down. Consult this card before you serve her again.

In all probability your patron has no exact knowledge of the anatomy of her skin, hair, and nails. This gives you an opportunity to make her see your viewpoint, think as you think, and feel as you feel about her needs. The beauty services you have to sell include:

Haircuts, on which the patron's hairstyle is based.

Shampoos and rinses, upon which depend the health and luster of the hair.

Hairdresses, or hairstyles, which require the adapting of waves and curls to becoming and modern coiffures.

Permanent waves, which require an exact knowledge of hair form and texture, besides great skill and experience.

Scalp massage, which every patron needs to keep her hair in good condition and which you should recommend to every patron who comes to the shop.

Hair bleaching and coloring, which require your best judgment and your most careful technique.

Manicures, which must be given with sterile instruments and which must satisfy the patron in every detail.

Facials, which leave the patron relaxed, fresh, and lovely, and therefore very grateful to you.

Eyebrow arches, which give a well-groomed appearance and alter the facial expression in the way the patron desires.

Make-up, which emphasizes good points and minimizes defects in nature's handiwork.

Selling Shop Merchandise

The profits from the sale of cosmetics, hair nets, hairpins, combs and brushes, hair ornaments, gift items, and so forth, should be a recognized part of a shop's income.

Cosmetic satisfaction depends upon the quality of the product and its suitability to the patron's special needs. You are selling beauty, and not the contents of bottles and jars in which beauty is hidden away. You must believe in the preparations you sell; to believe in them, you must know that they have met every test, and you must have exact knowledge of their

composition, the probable effects of their application, and their correct use.

While you are giving a service in a booth, you are in a position to interest your patron in the cosmetics you are using at the time or others which you wish to sell. Let her handle the bottles and jars; call her attention to the reliability of your "line" and the purity of the product, its action on the skin, and its beneficial results. Your knowledge of the structure of the skin and the effects of cosmetics upon its tissues will give you confidence to speak with authority.

Listen attentively; your patron may give you a clue to her habits, occupation, and social diversions. There is a cosmetic for you to recommend for her use in her every activity. If she does her own housework, suggest hand lotions, creams, and so forth. If she complains of aching feet, tell her of your balms and powders. Suggest that she protect her skin and insure the stability of her make-up with foundation cream during her travels. If she wishes to match her lip rouge with her new spring or fall clothes, advise her sincerely. Bath items and deodorants are excellent summer suggestions. Be up to the minute in your conversation about the world of fashion. If gay colors are in vogue, suggest brighter make-up. Wear the latest make-up yourself, if it is becoming to you and suitable for your work. For the beach, suggest dark glasses, a good hair net, and a pocket brush and comb.

Give a complimentary make-up, if this is the policy of your shop, and give it as willingly to a patron you do not admire as to one of your best-liked customers.

Do not oversell. It is better to sell a small item and retain a satisfied customer, to get her "repeat business," than to sell a pound jar to a patron whom you may never see again. Persistent sales efforts annoy some patrons. Explain and persuade, but do not attempt "high pressure"; leave the final decision to her: it is she who should make it.

Your knowledge of your stock, your interest in your patrons' needs, and your well-arranged display will be rewarded by more frequent sales. Thus, your chances for promotion will be increased and a larger income assured for yourself as well as for the shop.

Chapter III

CELLS AND TISSUES

Biologically, the living body is made up of cells, tissues, organs, and systems.

Chemically, all matter is composed of 92 elements, which exist alone or in combination with one another. The sixteen principal elements of which the human body is composed are: carbon, hydrogen, oxygen, nitrogen, sulphur, phosphorus, chlorine, sodium, potassium, calcium, magnesium, iron, and small quantities of silicon, fluorine, iodine, and manganese.

Cells

A cell is one of the units of structure which make up organic (live) tissue in animals and plants. It is the simplest unit of living matter which can maintain an independent existence and reproduce itself. The qualities of the living cell are: reproduction, growth, and self-repair.

The human body begins with the fertilized germ cell, which splits into two cells. This process continues until a mass of cells develops into a tissue. In the early stages of growth one cell is like another. These first cells absorb food, eliminate waste, and are capable of movement and reproduction. But as development of an organism proceeds, changes take place. Some cells become better adapted for digesting food; others are best fitted for distributing it. Muscle cells specialize in contractility, nerve cells specialize in conductivity, and scavenger cells engulf bacteria and waste. These cell changes are called **cell differentiation**. Cells are joined together by a tissue fluid, termed **intercellular substance**.

Structure of the Cell

All living cells are composed of **protoplasm**, the only known form of matter that manifests life. It is an almost colorless, sticky, semifluid substance which in some instances is seen

under the microscope to be in continual motion. It is composed of protein, fat, and carbohydrate, with water and inorganic salts in solution. Small masses of protoplasm form cells which surround themselves with a thin membrane called the **cell wall**. This wall is permeable; through it the cell takes up food and oxygen, discharges waste, and, with the help of chemical ferments called **enzymes**, "burns" its food and throws off the resulting carbon dioxide.

The **nucleus**. Each cell, with the exception of the red blood cells, contains a nucleus. This is the vital part of the cell—the part which divides first in the process of reproduction of the typical body cell. It is surrounded by its own tough membrane and contains masses of **chromatin**, which at the time of cell division separate into short sections called **chromosomes**. Inside the nucleus, a small body called the **nucleolus** can usually be found. Its nature and function have not been established.

The **cytoplasm** is the main body of the cell, exclusive of the nucleus. It may be seen to contain the results of the activity of the cell: unabsorbed food, waste, or substances of its own manufacture. Small bodies, called **Golgi bodies**, tangled in a Golgi net, are found in the cytoplasm.

Functions of the Cell

The functions of the cell are as follows:

1. **Reproduction** by cell division.
2. **Contractility**.
3. **Excitability** or irritability, as exhibited by reaction to stimuli.
4. **Conductivity**, or ability to conduct a stimulus.
5. **Metabolism**, the continuous building-up (anabolism) and breaking-down (catabolism) processes of chemical nature.

Reproduction by Cell Division

Reproduction by cell division may be of either one of the following types:

1. **Amitotic division** (amitosis), which rarely takes place in human tissues, in which there is first a simple splitting of the

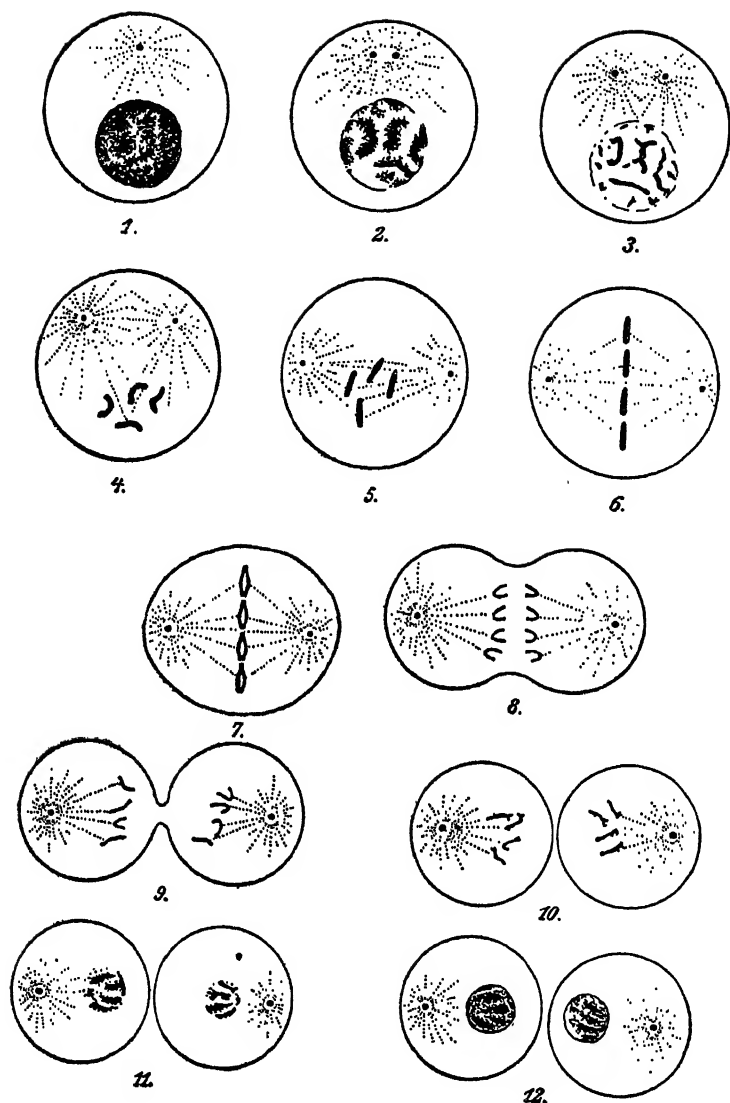


FIG. 1. THE DIVISION OF THE CELL IN 12 STAGES.* 1, 2, 3. Chromosomes are formed within the nucleus. 4, 5, 6. The division figure is perfected. 7, 8, 9. Division of chromosomes and beginning of cell division. 10, 11, 12. Reconstruction of two nuclei and completion of division.

* From *Ascaris, the Biologist's Story of Life*, by Richard Goldschmidt, New York, Prentice-Hall, Inc., 1937, page 303.

nucleus without change in its structure (such as the forming of chromosomes), followed by the division of the cytoplasm.

2. **Mitotic division** (mitosis), the common mode, which is a more complicated process. The protoplasm of the cell develops two centers of attraction which draw apart. The chromatin of the nucleus forms a series of beads or rods which separate into sections called **chromosomes**, the number of which, in the human body, is 48. The nucleus, as such, dissolves, and the chromosomes form a cluster midway between the two centers of attraction. Each chromosome then divides into two parts, each part making its way to an opposite attraction sphere, where it forms one of a group of 48 half-chromosomes. These dissolve again into their chromatin granules, and a new nucleus is formed. Meanwhile the cell has been changing itself into an hourglass shape, which now divides in the center into two cells, each having a nucleus and a cell wall. These two new cells have all the elements of the parent cell. The chromosomes have been called "carriers of heredity." They carry the pattern for every detail of body structure.

Tissues

Tissues are composed of masses of cells of the same kind and are united into organs. Each organ performs a special function. Each tissue can be recognized by its characteristic appearance.

The tissues may be classified as follows:

1. Epithelial tissues:

- a. Cover the body surfaces, outer and inner, including the cavity linings which come in contact with the air (mucous membranes).
- b. Form smooth linings, as in the chambers of the heart, the digestive and respiratory tracts, and so forth.
- c. Form the glands.

2. Connective tissues:

- a. White fibrous tissue, as that of the ligaments of the joints and the tendons of the muscles.

- b. Yellow fibrous (elastic) tissue, as that of the larynx and the Eustachian tube.
 - c. Areolar tissue—that of interlacing fibers which form spaces and partitions for organs.
 - d. Reticular tissue; a very fine network of fibers which form lymph nodes, for example. It is present in bone marrow.
 - e. Adipose tissue, consisting of cells loaded with fat.
 - f. Cartilage, the substance of the cartilages.
 - g. Bone tissue, compact and cancellous.
 - h. Blood tissue—that of the plasma, with red and white cells and platelets.
3. Vascular tissues—those of the blood vessels, lacteals, and so forth.
 4. Muscular tissues—the substance of the muscles.
 5. Nervous tissues—those of the nerves and nerve centers.

The Body Systems

A body system is a group of organs made up of tissues, interdependent and performing a unified series of functions. The systems of the body are:

1. The skeletal system.
2. The muscular system.
3. The nervous system.
4. The circulatory (vascular) system.
5. The respiratory system.
6. The digestive (alimentary) system.
7. The excretory system.
8. The endocrine system.
9. The urogenital system.

Only the first four of these systems will be discussed in this book.

Questions

1. Biologically, of what is the living body composed?
2. Of how many chemical elements is matter composed?
3. Name the 16 principal elements of which the human body is composed.

4. What is a body cell?
5. What are the qualities of a living body cell?
6. In what manner does the human body begin?
7. What is meant by "cell differentiation"?
8. How are cells joined together?
9. Of what substance are all living cells composed?
10. Describe protoplasm.
11. What is the cell wall?
12. Name two structures that are contained within the cell.
13. What is the vital part of the cell?
14. Describe the nucleus of the cell.
15. What is chromatin?
16. What are chromosomes?
17. Where is the nucleolus found?
18. Describe the cytoplasm of the cell.
19. What are the functions of the body cell?
20. How is cell reproduction accomplished?
21. Name the two kinds of cell division.
22. Describe amitotic division (amitosis).
23. Describe mitotic division (mitosis).
24. What are body tissues?
25. What is a body organ?
26. Name the different kinds of body tissues.
27. In what parts of the body are epithelial tissues found?
28. Name the different kinds of connective tissues, giving the parts of the body where they are found.
29. In what parts of the body are vascular tissues found?
30. In what parts of the body are muscular and nervous tissues found?
31. What is a body system?
32. Name the systems of the human body.

Chapter IV

THE SKELETAL SYSTEM

The skeletal system is the framework which supports and protects the other body systems. It is made up of bones, cartilages, and ligaments, all of which have as a basis of their structure connective tissue cells and fibers.

The Bones

The number of bones in the adult human skeleton is usually given as 200. Some anatomists name 206 by including the ossicles of the ear; and if one adds the sesamoid bones, those occasional accumulations of bone at sites of irritation, the number may be further increased.

The bones of the skeletal system are distributed as follows:

Spinal column:	
Vertebrae	24
Sacrum	1
Coccyx	1
Skull:	
Cranium ...	8
Face	14
Chest and neck:	
Hyoid . .	1
Sternum .	1
Ribs	24
Shoulder girdle ..	4
Upper extremities:	
Arm and hand	60
Pelvic girdle ..	2
Lower extremities:	
Patella	2
Leg and foot ..	58
Total	200

The classification of bones is usually made according to their shape:

Long bones, such as those of the leg.

Short bones, such as those of the fingers.

Flat bones, such as those of the top of the skull.

Irregular bones, such as those of the spinal column.

The functions of the bones are to support and protect the body organs and to furnish points of attachment for the muscles. Certain bones also provide cavities where the delicate elements of the marrow may produce red and white blood cells.

Chemical composition of bone. Chemically, bone consists of the following:

Organic (live) matter (33%):

Bone cells

Blood vessels

Connective tissues

Marrow

Inorganic (mineral) matter (67%):

Calcium phosphate

Calcium carbonate

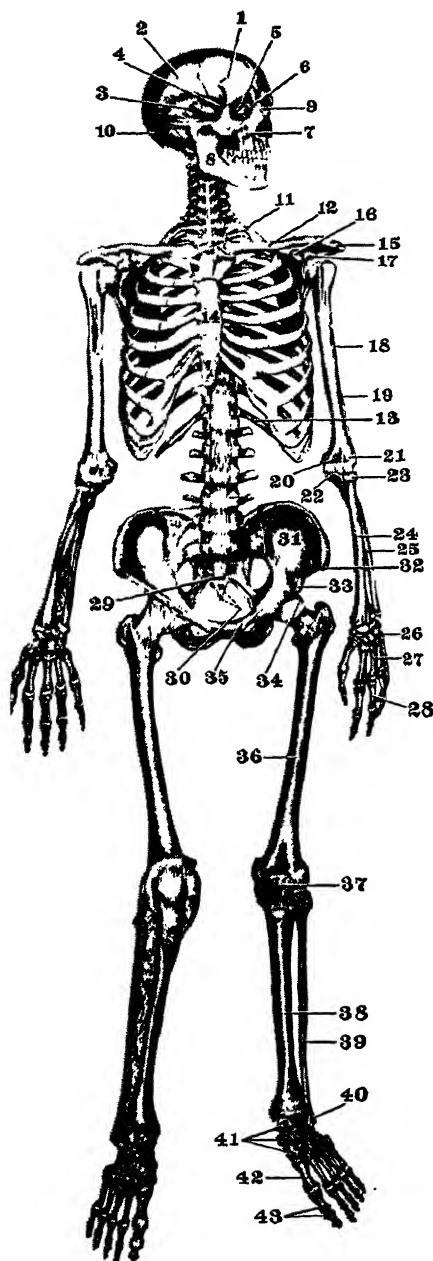
Other salts

Bone tissue is made up of many **white** fibers, which give it strength, and of fewer **yellow** fibers, which give it a certain degree of springiness and elasticity that help to prevent fracturing. As the yellow fibers are more or less short-lived, the bones of old people lack these and therefore break easily. There are two kinds of bone tissue:

1. **Compact**, or dense, tissue, which forms the walls of the bones and is traversed by channels, called **Haversian canals**, where branches of blood vessels lie.

2. **Cancellous**, or spongy, tissue, which lies in the interior of bones and appears at the ends of a bone shaft.

The large cavity in a long bone is called the **medullary canal**. Cavities in this canal contain the **marrow**, which is also found in the spaces of cancellous tissue of other bones. The surfaces of bones are covered with a tough, fibrous membrane

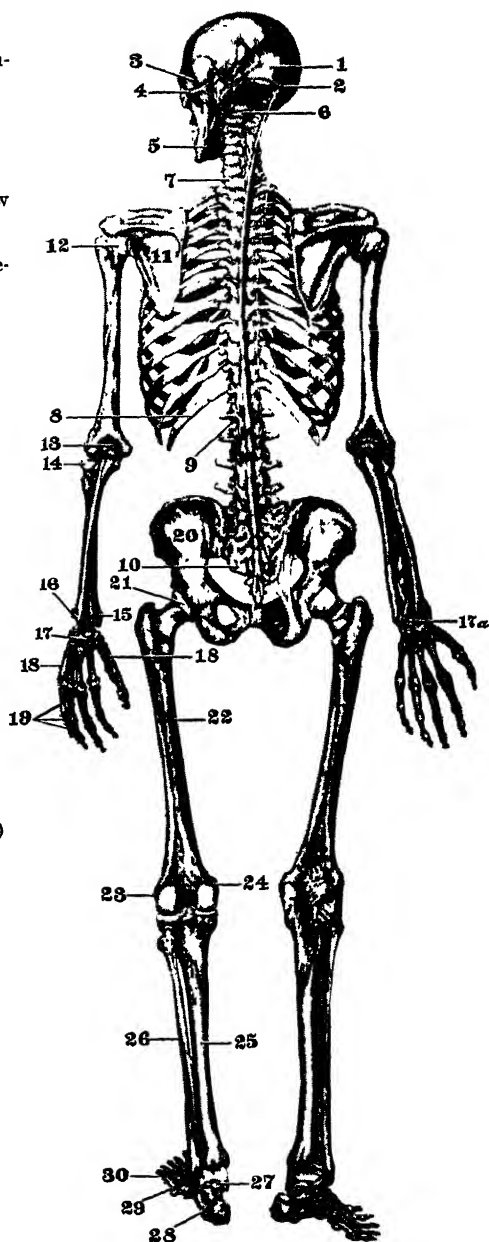


1. Frontal bone
2. Parietal bone
3. Temporal bone
4. Sphenoid bone
5. Ethmoid bone
6. Lacrimal bone
7. Maxilla, or upper jaw bone
8. Mandible, or lower jaw bone
9. Nasal bone
10. Occipital bone
11. First rib
12. Collar bone or clavicle
13. Twelfth rib
14. Body of sternum
15. Acromion, or acromial process
16. Coracoid ("Crow's beak") process
17. Glenoid cavity
18. Deltoid tuberosity
19. Humerus, or upper arm bone
20. Coronoid fossa
21. Radial fossa
22. Coronoid process
23. Head of radius
24. Radius ("spoke")
25. Ulna, or elbow bone
26. Bones of the wrist
27. Metacarpal bones
28. Phalanges (of the fingers)
29. The sacrum (sacral bone)
30. Coccyx
31. Ilium, or flank bone
32. Anterior superior iliac spine
33. Anterior inferior iliac spine
34. Head of femur
35. Pubic bone
36. Femur, or thigh bone
37. Knee-cap
38. Shin bone
39. Calf bone
40. Ankle bone
41. Tarsal bones
42. Metatarsal bones
43. Phalanges (of the toes)

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FIG. 2. THE SKELETAL SYSTEM (FRONT).

1. Occipital bone
2. External occipital protuberance
3. Sphenoidal bone
4. Arch of zygoma
5. Mandible, or lower jaw bone
6. Atlas (first cervical vertebra)
7. Seventh cervical vertebra
8. Twelfth rib
9. First lumbar vertebra
10. Sacral bone
11. Shoulder blade
12. Head of humerus
13. Olecranon, or point of elbow
14. Head of radius
15. Base of radius
16. Head of ulna
17. Bones of the wrist
- 17a. Wrist joint
18. Metacarpal bones
19. Phalanges (of the fingers)
20. Hip bone
21. Head of femur
22. Thigh bone
23. Lateral condyle of femur
24. Medial condyle of femur
25. Shin bone (Tibia)
26. Calf bone (Fibula)
27. Ankle bone
28. Heel bone
29. Metatarsal bones
30. Phalanges (of the toes)



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FIG. 3. THE SKELETAL SYSTEM (BACK).

called **periosteum**, which receives the attachments of all tendons and ligaments. The membrane lining the cavities of hollow bones is called **endosteum**.

The blood and nerve supply of the bones. Blood vessels, lymph capillaries, and nerve filaments make their way through the periosteum into the interior of the bones. Through the openings at the ends of long bones and on the surface of short bones veins emerge.

The growth of the bones is rapid at the beginning of life, gradually slowing down until, at the age of 18 or 19 years, it ceases, and cell multiplication takes place thereafter only for the purpose of repair. Tissue cells are constantly being worn down and built up. In old age the destructive process predominates; the bones become brittle and porous; fractures mend slowly.

Cartilage

Cartilage (gristle) is present wherever the body needs its qualities of flexibility and elasticity to move or change the positions of the parts of the skeletal system. It is well designed to ease the wear and tear of joint motion; it yields to strain, and is thus able to absorb the shocks resulting from injuries or blows. It has no nerve supply and cannot feel pain; it has no delicate blood vessels to suffer constriction when a part is under pressure. Cartilage receives its nourishment by a seepage of fluids through its fibers from the blood and lymph vessels of the surrounding tissues. In old age, calcium salts are taken up by cartilage fibers, causing rigidity and stiffness, especially near the joints, where the greater number of muscle tendons are attached to the bone. There are three kinds of cartilage:

1. **Hyaline**, the type present on the surface of the bones, in the ribs, and in freely moving joints. It is clear and transparent, and contains many white fibers.
2. **Fibrocartilage**, found between the disks of the vertebrae. Its white fibers are coarse and tough.
3. **Elastic**, found where flexibility is greatly needed, as in the epiglottis. It is formed principally of yellow fibers.

Ligaments

A **ligament** is a band usually made up of coarse bundles of white fibrous connective tissue closely interlaced. These bands wrap and combine to hold the bones firmly together and to retain organs in place. Between the ends of bones, under the cartilage and ligaments, is a thin membrane which secretes a lubricating fluid called **synovial fluid**. The function of this fluid is to prevent friction.

Joints

A **joint**, or **articulation**, is an arrangement at the place where two bones of an animal body are joined together. Some articulations are **immovable**, as in the case of the skull. "The bones of immovable joints are held rigidly together, almost in contact with each other, by fibrous connective tissue or by cartilage. The opposed margins of the bones are jagged and irregular, and they dovetail into each other, forming a very firm, unyielding union. Such a union is spoken of as a *suture*."¹ The **movable** articulations are of four types:

1. **Ball and socket**, as of the hip and shoulder.
2. **Hinge**, as of the knee, elbow, and phalanges.
3. **Pivot**, in which one bone rotates upon another, as where the radius of the forearm rotates upon the ulna.
4. **Gliding**, in which small bones are united by ligaments, as in the carpals of the wrist.

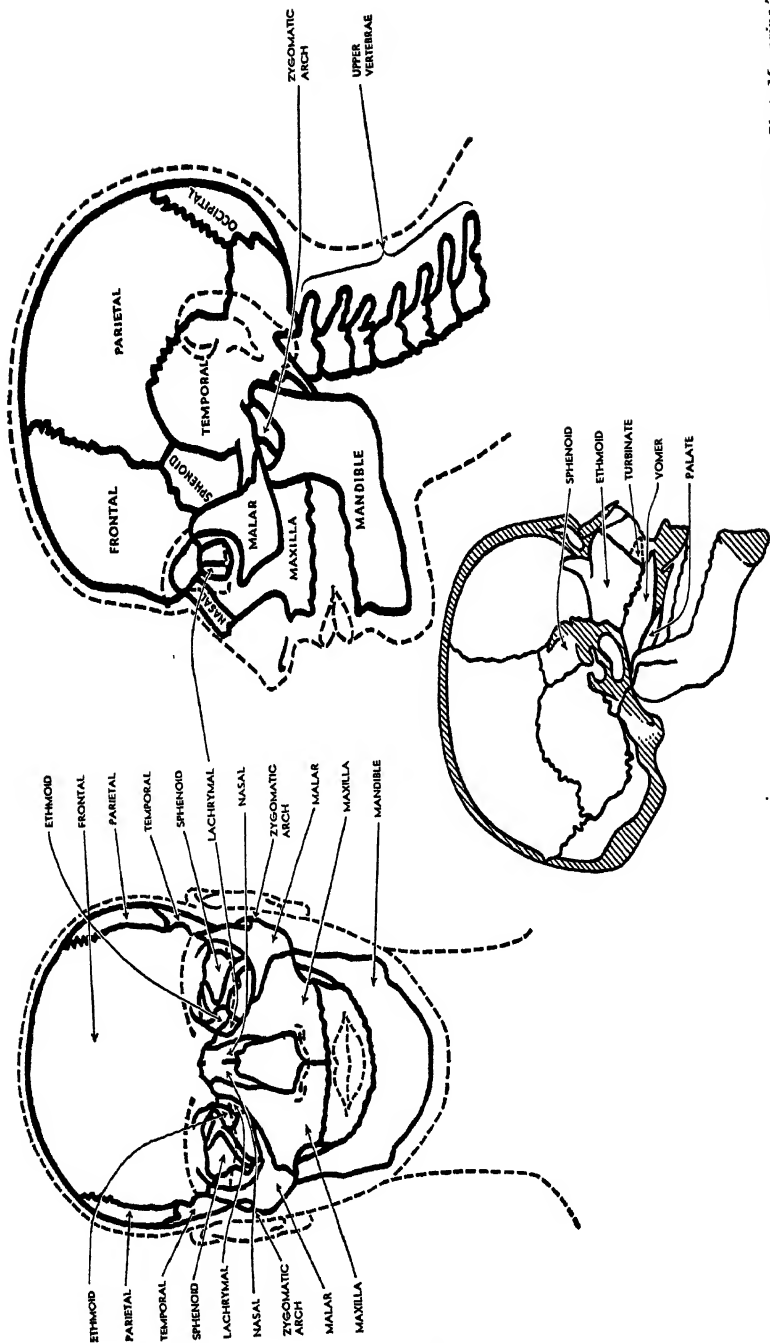
The Bones of the Skull

(Refer to the chart on page 20.)

The **skull** is situated on top of the first vertebra of the spine. It is egg-shaped, with the wider part at the back, and is composed of bones of various shapes. Most of these bones are immovable, being joined together by suture.

The parts of the skull are **classified** into the **cranium** and the **face**.

¹ Hickman, C. P., *Functional Human Anatomy*. New York: Prentice-Hall, Inc., 1940, page 77.



Courtesy of "Modern Beauty Shop Magazine."

1. The **cranium** is the part which encloses the brain. It is made up of eight bones, as follows:

One occipital—Forms the back and base of the skull.

Two parietal—Form most of the sides and part of the roof of the skull.

One frontal—Forms the front of the skull, the roof of the orbits, and the nasal cavity. Within it are the frontal sinuses which connect with the nasal cavity.

Two temporal—Located at the sides and base of the skull.

One sphenoid—Located at the anterior part of the skull at the base; fills in the space between the frontal bone and the temporal and occipital bones.

One ethmoid—Forms part of the base of the skull and part of the orbits and nasal cavities.

2. The **face** is made up of fourteen bones, as follows:

Two superior maxillary—Form the upper jaw.

One inferior maxillary—Forms the mandible or lower jaw and contains the lower teeth.

Two malar—Are called the cheek bones.

Two nasal—Form the upper part of the bridge of the nose.

Two lachrymal—Small bones forming a part of the inner wall of the orbits and lachrymal canals.

Two inferior turbinate—Located on the outer wall of the nasal cavity.

One vomer—Located at the back of the nasal cavities; forms the lower part of the nasal septum.

Two palate—Form, with the maxillae, the hard palate of the mouth and part of the nasal cavity.

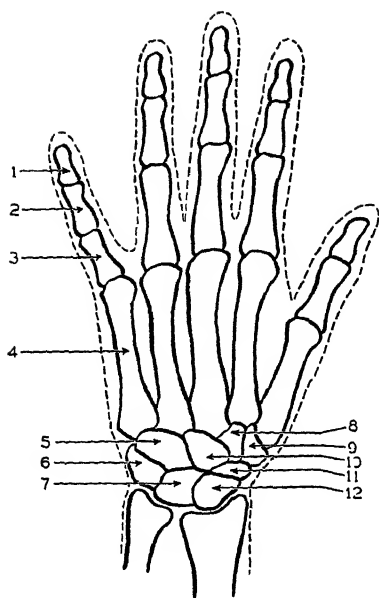
The **hyoid** is a horseshoe-shaped bone situated at the base of the tongue.

The Bones of the Shoulder Girdle, Arm, and Hand

1. **Shoulder girdle:**

Two clavicle (collar bone)—Articulate with the sternum and scapula.

Two scapula (shoulder blade)—Articulate with the clavi-



1. Third phalange
2. Second phalange
3. First phalange
4. Metacarpal
5. Unciform (Hamate)
6. Pisiform
7. Cuneiform (Triangular)
8. Trapezoid (Lesser Multangular)
9. Trapezium (Greater Multangular)
10. Os magnum (Capitate)
11. Scaphoid (Navicular)
12. Semilunar (Lunate)

FIG. 4a. BONES OF THE WRIST AND HAND.

cles. The shallow cavity receives the head of the humerus.

2. Arm and hand:

One humerus (upperarm bone)—Articulates with ulna and radius.

One ulna (large bone of forearm).

One radius (small bone of forearm)—Its styloid process at the lower end articulates with the bones of the wrist.

Eight carpal (carpus, wrist), arranged in two rows:

Proximal Row

Scaphoid
Semilunar
Cuneiform
Pisiform

Distal Row

Unciform
Os magnum
Trapezoid
Trapezium

Five metacarpal—The bones of the body of the hand; articulate with phalanges.

Fourteen phalanges—The lower row articulate with the metacarpals; the upper row, with other phalanges.

The fingers (digits) are named as follows:

1. Pollex (thumb).
2. Index (forefinger).
3. Medius (middle finger).
4. Annularis (ring finger).
5. Auricularis (little finger). So called because it can be inserted into the auricle of the ear.

Questions

1. What is the skeletal system?
2. Of what is the skeletal system composed?
3. How many bones are there in the human skeleton?
4. How are bones classified? Give an example of each.
5. What are the functions of the bones?
6. What vital function does bone marrow perform?
7. What is the chemical composition of bone?
8. Describe the fibers of bone tissue.
9. What kind of fibers give the bone its strength?
10. What kind of fibers give springiness and elasticity?
11. Why do the bones of old people break easily?
12. Of how many kinds of tissue is bone composed?
13. Where is compact tissue found?
14. What are Haversian canals?
15. Where is cancellous tissue found?
16. What is the medullary canal?
17. Where is marrow found?
18. What is the fibrous membrane covering the bones called?
19. What is the lining of bone cavities called?
20. Are bones supplied with nerves and blood vessels?
21. Discuss the growth of bones.
22. How does cartilage fill a body need?
23. Does cartilage contain nerves and blood vessels?
24. How does cartilage receive its nourishment?

25. How many kinds of cartilage are there?
26. Where is hyaline cartilage found? Fibrocartilage?
27. Of what kind of fibers is elastic cartilage composed?
28. Define *ligament*.
29. What is synovial fluid?
30. What is the function of synovial fluid?
31. What is a joint?
32. How many types of joints are there? Define *suture*.
33. Name the four kinds of joints, giving an example of each.
34. What is the skull? Where is it located?
35. How are the bones of the skull joined together?
36. Into what two parts is the skull divided?
37. What does the cranium enclose?
38. Of how many bones is the cranium composed?
39. How many bones are there in the face?
40. Name and locate the bones of the cranium.
41. Name and locate the bones of the face.
42. Where is the hyoid bone located?
43. Name the bones of the shoulder girdle.
44. Where is the humerus situated?
45. Of how many bones is the forearm composed?
46. How many bones are there in the wrist?
47. What are the wrist bones called?
48. Where are the metacarpal bones situated?
49. How many bones are there in the fingers?
50. What are the bones of the fingers called?
51. What are digits?
52. How are the fingers named?

Chapter V

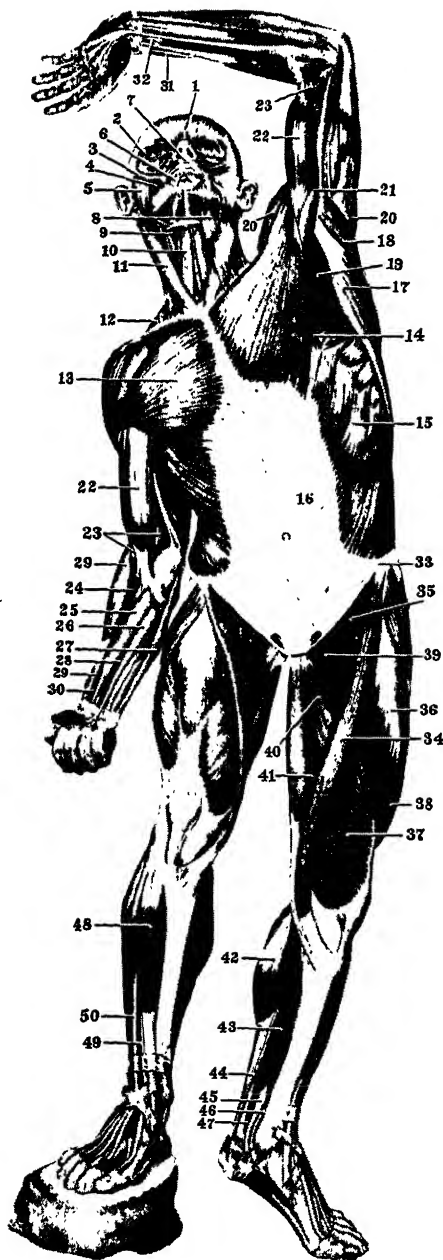
THE MUSCULAR SYSTEM

Muscle is a mass of tissue whose special function is to produce motion. The performance of this function has been most clearly described by Richard Goldschmidt as follows:¹

To produce motion it must, of course, be attached to the part to be moved, as well as at the end toward which the movement takes place. The details, however, depend completely upon the type of movement to be produced. The most obvious method is the one found in our limbs. It is known that they consist of a series of levers, the bones, connected by joints. A muscle which is to move a lever must therefore be attached to the bone, and very strongly fastened to it, at that. This is done in a special way: the muscle fibers near the point of attachment are chemically transformed into a very strong substance not easily torn, called a *tendon*. Such a tendon may be very short, or very long, thus enabling some muscles to transmit their contraction to a far-distant bone. By the typical arrangement of the two attachments of both ends of each muscle to a definite part of a bone, each muscle is fitted to form one definite movement. The combined movements produced by a series of muscles in their marvelous, exactly checked collaboration constitute the apparently simple and perfect movement of limb—arm, leg, or wing.

The point of attachment of a muscle to the part to be moved is called the *insertion*; the end toward which the movement takes place is called the *origin*. The cord or band of tough, dense, inelastic tissue into which the muscle fibers are “chemically transformed,” and which connects the muscle with another part, is called a *tendon*. Tendons cannot contract, but transmit the pull on the bones at both ends of the muscle. Where a tendon passes over a joint, it is held in place by liga-

¹ Goldschmidt, Richard, *Ascaris, the Biologist's Story of Life*. New York: Prentice-Hall, Inc., 1937, page 99.

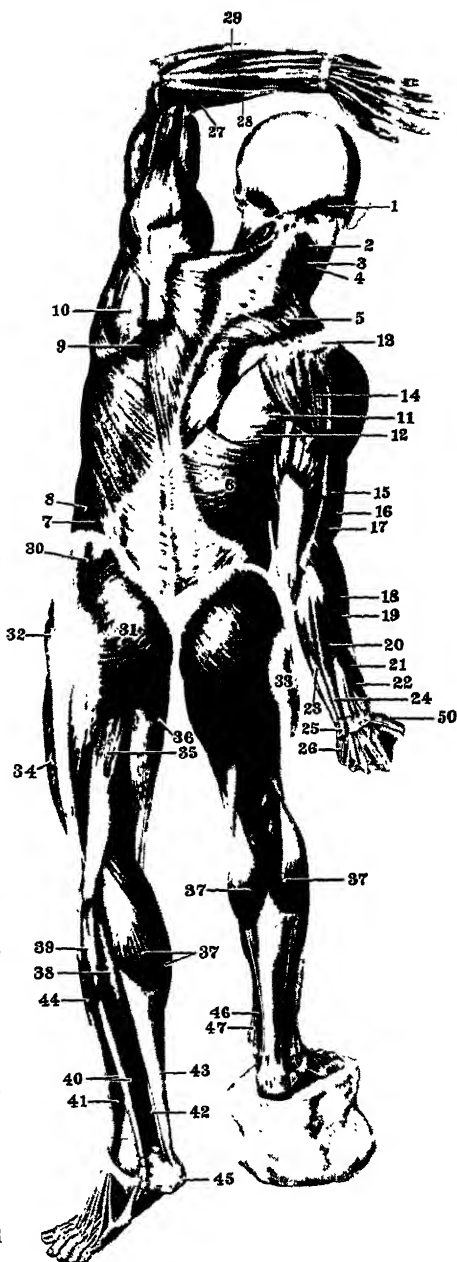


1. Frontal muscle
2. Orbicular muscle of the eye
3. Zygomatic muscle
4. Cheek muscle
5. Masseter muscle
6. Quadrate muscle of the lower lip
7. Orbicular muscle of the mouth
8. Platysma (or flat muscle)
9. Thyreohyoid muscle
10. Omohyoid muscle
11. Sternocleido-mastoid muscle
12. Trapezius muscle
13. Greater pectoral muscle
14. Smaller pectoral muscle
15. External oblique muscle of abdomen
16. Sheath of the rectus muscle of abdomen
17. Broadest muscle of the back
18. Larger round muscle
19. Subscapular muscle
20. Deltoid muscle
21. Coraco-brachial muscle
22. Biceps muscle
23. Brachial muscle
24. Round pronator muscle
25. Radial flexor muscle of wrist
26. Long palmar muscle
27. Ulnar flexor muscle of wrist
28. Superficial flexor muscle of fingers
29. Brachio-radial muscle
30. Quadrate pronator muscle
31. Long abductor of the thumb
32. Deep flexor of the digits
33. Anterior superior iliac spine
34. Sartorius ("tailor") muscle
35. Iliac muscle
36. Straight muscle of the thigh
37. Middle great muscle
38. Lateral great muscle
39. Pectineus muscle
40. Long adductor muscle
41. Great adductor muscle
42. Gastrocnemius muscle
43. Soleus muscle
44. Achilles tendon
45. Long flexor of the digits
46. Posterior tibial muscle
47. Long flexor of the toe
48. Anterior tibial muscle
49. Long extensor of great toe
50. Long extensor of the digits

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FIG. 5. THE MUSCULAR SYSTEM (FRONT).

1. Occipital muscle
2. Semispinal muscle of head
3. Splenius muscle of head
4. Sternocleido-mastoid muscle
5. Trapezius muscle
6. Broadest muscle of back
7. Internal oblique muscle of abdomen (Lumbar triangle)
8. External oblique muscle of abdomen
9. Larger rhomboid muscle
10. Infraspinous muscle
11. Smaller round muscle (covered by fascia)
12. Larger round muscle
13. Scapular spine
14. Deltoid muscle
15. Brachial muscle
16. Biceps muscle of upper arm
17. Brachioradial muscle
18. Long radial extensor muscle of carpus
19. Short radial extensor muscle of carpus
20. Common extensor muscle of fingers
21. Long abductor muscle of thumb
22. Short extensor muscle of thumb
23. Ulnar extensor muscle of the wrist
24. Proper extensor muscle of fifth finger
25. Dorsal ligament of wrist
26. Abductor muscle of fifth finger
27. Round pronator muscle
28. Radial flexor muscle of wrist
29. Ulnar flexor muscle of wrist
30. Middle gluteal muscle
31. Greatest gluteal muscle
32. Tensor muscle of broad fascia
33. Great trochanter
34. Lateral great muscle
35. Biceps ("two-head") muscle of thigh (long head)
36. Great adductor muscle
37. Gastrocnemius muscle
38. Soleus muscle
39. Long peroneal muscle
40. Short peroneal muscle
41. Long extensor muscle of the digits
42. Long flexor of the great toe
43. Calcanean tendon
44. Anterior tibial muscle
45. Heel bone
46. Long flexor of the digits
47. Tendon of posterior tibial muscle



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FIG. 6. THE MUSCULAR SYSTEM (BACK).

ments which prevent it from sliding or pulling away from the joint. Tendons are sometimes called **sinews**.

The position and function of the more than five hundred muscles of the body determine their shape, which may be in the form, for example, of flat strips or long or short rounded bunches of muscle fibers. The shape of a muscle depends, in turn, upon the arrangement of its inner muscle fibers. The muscles comprise more than two-fifths of the weight of an average person.

The characteristics of muscle are:

1. Excitability or irritability—the power of responding to stimuli.
2. Contractility—which depends upon the strength of the stimulus, the weight of the load, and the degree of temperature present.
3. Extensibility—the ability to stretch.
4. Elasticity—the ability to recover the original form.

Composition of muscle. Muscle cells form extremely fine fibers, which are grouped in bundles, many bundles uniting to form a muscle. The cells are of different shapes and sizes; some are long and ribbonlike, some are short and fusiform, and others are short and rectangular.

The fascia. Of the sheath of fine connective tissue, called the *fascia* (band), which encloses each bundle of fibers and sends down partitions between the bundles, separating them, Hickman says:²

Fascia, in its broadest sense, refers to the connective tissue which surrounds and invests the various organs of the body. So far as muscles are concerned, two types of fasciae are recognized, *deep* and *superficial*. The deep fascia is in close relationship with the bones, ligaments, and muscles. . . . The deep fascia also envelops glands and encloses all blood vessels and nerves. . . . The superficial fascia . . . is the loose areolar connective tissue just underneath the skin and is continuous over the whole surface of the body. . . . The superficial fascia blends into the dermis of the skin, and they move together over the deeper layers. In some situations cutaneous

² Hickman, C. P., *Functional Human Anatomy*. New York: Prentice-Hall, Inc., 1940, pages 108–109.

muscles are found in the superficial fascia and aid in the movement of the skin. Notable examples are the facial muscles.

Aponeuroses are thick, dense fasciae which cover and form terminations and attachments of many muscles, as those of the scalp.

Classification of the muscles. Muscles may be divided into three classes, as follows:

1. **Striated, or voluntary,** muscles are made up of long, ribbonlike cells which are under the control of the cerebrospinal nervous system. They are characterized by swiftness and suddenness of action. Skeletal muscles are of this type.

2. **Nonstriated, or involuntary,** muscles (also called "smooth muscles") are made up of spindle-shaped cells without striations. These are the muscles of organs that are not controlled by the will, but by the sympathetic nervous system, for example, the walls of the stomach and blood vessels which function in digestion, respiration, and other inner processes. Their contraction is slower and more deliberate than that of muscles of the voluntary type.

3. **Cardiac muscle** forms the substance of the heart. Its branched fibers are striped and involuntary, and are capable of rhythmic action.

Blood and nerve supply. Blood, with food and oxygen, is brought to the muscle cells by branches from the arteries; the muscular waste products are returned through the veins. Motor nerves cause contraction, and sensory nerves carry information to the higher centers of the central nervous system.

Heat production in muscle. Heat is liberated in a muscle by the oxidation (burning) of food substances while the muscle is changing its form and exerting its pull. Heat is greatly increased by muscular exercise, although the maintenance of any posture requires a certain amount of muscular activity. More heat is produced when we are on our feet than when we are lying down.

Muscle tone is the normal degree of tension of a healthy muscle. Without proper tone, body movements are clumsy and erratic. Even when we are at rest, muscles have "muscle

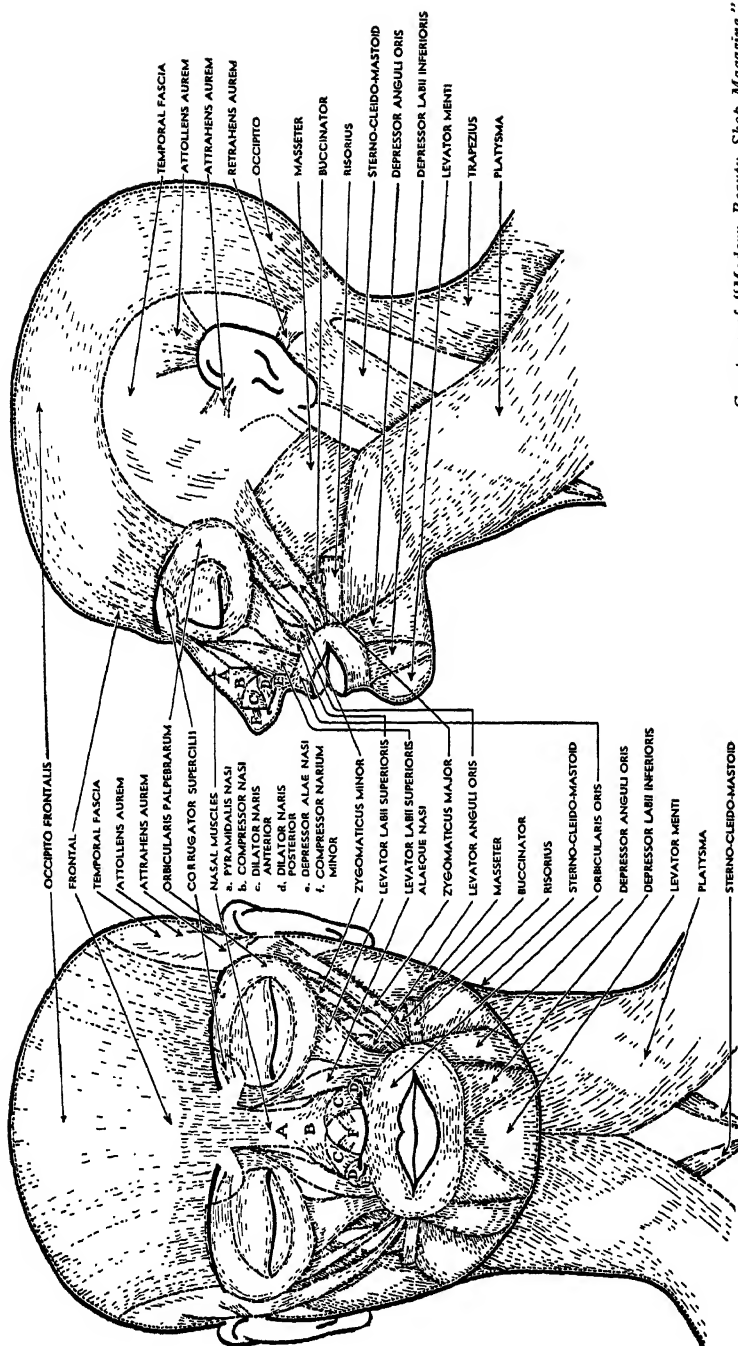


FIG. 7. SURFACE MUSCLES OF THE HEAD AND NECK.

Courtesy of "Modern Beauty Shop Magazine."

tone." This consists of the simultaneous contraction of only a few of the fibers of which a muscle is composed. Another similar number give service in their turn, each fiber working for only a brief interval of time. As tone increases, the number of fibers in contraction increases, muscle metabolism is high, and much energy is liberated by heat. When tone is low, metabolism is low and little heat is liberated.

Muscular fatigue may be due to the exhaustion of essential chemicals or to the accumulation of acids. That the latter is an important factor is shown by the fact that fatigue can be induced in a perfectly vigorous muscle if the muscle is suffused with blood containing lactic acid. The feelings of fatigue may be caused by the painful stimuli aroused in muscle by the decreased alkalinity produced by the rise in lactic acid content. Dead muscle is found to contain lactic acid.

The work of a muscle increases its size and strengthens it. Stimulation of voluntary muscle causes an increase in muscular contraction. A rise of temperature quickens and a fall of temperature delays every phase of muscular contraction.

Muscular tissue can be relaxed or stimulated by various agencies. Nerve impulses affect muscle cells and electric currents have different effects on muscular tissue. Body contouring treatments, which include the use of light, heat, air, water, and vigorous body massage, are given for their effects on muscular tissue as well as on adipose tissue. Chemicals, such as salts, acids, and other irritants, are well-known agencies for stimulating muscular tissue.

Surface Muscles of the Head and Neck

(Refer to the accompanying chart.)

Occipito Frontalis, or Epicranius. This is the muscle of the scalp and is composed of two muscular portions joined together by a thin aponeurosis, or fibrous sheath.

a. Frontalis—Draws the scalp forward and raises the eyebrows.

b. Occipital—Draws the scalp backward.

Temporal Fascia—Fascia situated at the side of the head occupying the entire extent of the temporal fossa.

Attollens Aurem (*Auricularis Superior*)—Raises the ear.

Attrahens Aurem (*Auricularis Anterior*)—Draws the ear forward.

Retrahens Aurem (*Auricularis Posterior*)—Draws the ear backward.

Orbicularis Palpebrarum (*Orbicularis Oculi*)—Closes the eye and wrinkles the forehead.

Corrugator Supercilii—Draws the eyebrows up and down and inward, and wrinkles and stretches the forehead.

Nasal muscles:

a. **Pyramidalis Nasi** (*Procerus*)—Depresses the eyebrow and wrinkles the nose.

b. **Compressor Nasi** (*Compressor Narium*)—Compresses the nostril.

c and d. **Dilator Naris Anterior and Posterior**—Dilate the nostrils.

e. **Depressor Alae Nasi**—Closes the nostril.

f. **Compressor Narium Minor**—Compresses the nostril.

Zygomaticus:

a. **Major**—Draws the upper lip up and out.

b. **Minor**—Draws the upper lip back, up, and out.

Levator Labii Superioris—Raises the upper lip.

Levator Labii Superioris Alaeque Nasi—Raises the upper lip and dilates the nostril.

Levator Anguli Oris—Raises the angle of the mouth.

Masseter—Raises the mandible against the maxilla. It functions in mastication.

Buccinator—Flattens the cheeks and retracts the corners of the mouth.

Risorius—Draws the angle of the mouth out and compresses the cheeks.

Sterno-Cleido-Mastoid—Rotates the head, bends the head forward, and raises the chest.

Orbicularis Oris—With the aid of smaller muscles, it shapes the lips and closes the mouth.

Depressor Anguli Oris—Pulls down the corners of the mouth.

Depressor Labii Inferioris (*Quadratus Labii Inferioris*)—Depresses the lower lip.

Levator Menti (*Levator Labii Inferioris*)—Raises the lower lip and wrinkles the skin of the chin.

Trapezius—Draws the face to the side and the head backward, and rotates the scapula.

Platysma—Draws the corner of the mouth and the mandible downward.

Muscles of the Upper Extremities

Muscles of the Scapula:

a. **Levator Scapula**—Raises the upper angle of the scapula.

b and *c.* **Rhomboideus Major and Minor**—Retract and elevate the scapula.

d. **Serratus Anterior** (*Serratus Magnus*)—Abducts (draws aside) the arm.

e. **Deltoid**—Raises the arm and aids in carrying it forward and backward.

Muscles of the arm:

a. **Biceps Brachii**—Flexes and supinates the forearm, and flexes and adducts (draws toward its axis) the arm.

b. **Triceps Brachii**—Extends the arm and forearm.

c. **Coracobrachialis**—Flexes and adducts the arm.

Muscles of the forearm and hand:

<p><i>a.</i> Flexors <i>b.</i> Pronators <i>c.</i> Extensors <i>d.</i> Supinators</p>	}	<p>These muscles flex, pronate, extend, supinate, abduct, and adduct the forearm, wrist, and hand.</p>
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Questions

1. What is muscle?
2. What is the special function of muscle?
3. How does muscle produce motion?
4. What is meant by the "origin" of a muscle?
5. What is meant by "insertion"?

6. Define tendon.
7. What purpose do the tendons serve?
8. About how many muscles are there in the body?
9. What factors determine the shape of the muscles?
10. What percentage of the body's weight do the muscles comprise?
11. What are the characteristics of muscle tissue?
12. Discuss the composition of muscle.
13. How are muscle fibers formed? Of what shapes are muscle cells?
14. To what does *fascia*, in its broadest sense, refer?
15. What two types of fascia are recognized? Describe them.
16. Define *aponeurosis*.
17. What purpose does the aponeurosis of the scalp serve?
18. How are muscles classified?
19. What is meant by "voluntary" muscles? Give an example.
20. What are "involuntary" muscles? Give some examples.
21. How are striated muscles formed?
22. What nerves control the striated muscles?
23. Describe the fibers of which skeletal muscles are composed.
24. Of what kind of cells are nonstriated muscles composed?
25. Where are the nonstriated muscles found?
26. By which nervous system are the nonstriated muscles controlled?
27. What vital body organ is composed of cardiac muscle?
28. How does cardiac muscle differ from other types?
29. Are muscle fibers supplied with blood vessels?
30. Discuss the nerve supply of the muscular system.
31. How is heat liberated in muscle tissue?
32. Does exercise increase heat production in muscle?
33. What is meant by "muscle tone"? What is the effect of increased muscle tone?

34. When muscle tone is low, how is body energy affected?
35. To what factors is muscular fatigue due?
36. Does work increase the size of a muscle and strengthen it?
37. By what agencies may muscular tissue be affected?
38. Name the muscle of the scalp.
39. What is the action of the frontal muscle?
40. What is the action of the occipital muscle of the scalp?
41. How are the two parts of the scalp muscle joined together?
42. Name the muscles of the ear and give the action of each.
43. Name the muscle which closes the eye and wrinkles the forehead.
44. What is the action of the corrugator supercilii muscle?
45. Name the nasal muscles and give the action of each.
46. Name the muscle which elevates the upper lip.
47. What is the action of the levator labii superioris alaeque nasi muscle?
48. Name the muscle which raises the angle of the mouth.
49. Name the muscle of mastication and give its action.
50. What is the action of the buccinator muscle?
51. What is the action of the risorius muscle?
52. What is the action of the sterno-cleido-mastoid muscle?
53. Name the muscle which closes the mouth.
54. Give the action of the depressor anguli oris and the depressor labii inferioris muscles.
55. What is the action of the levator menti?
56. Name the muscle which draws the head backward or sidewise and rotates the scapula.
57. What is the action of the platysma muscle?
58. Name the four principal muscles of the scapula.
59. What is the action of the levator scapula? Of the rhomboideus major and minor muscles?
60. Name the muscle which abducts the arm.
61. What is the action of the deltoid muscle?

62. Name the three principal muscles of the arm and give the action of each.

63. Name the muscles of the forearm and hand and discuss their action.

Chapter VI

THE NERVOUS SYSTEM

The **nervous system** includes all the nerves, nerve tissues, and nerve centers of the body considered together. Its **function** is to respond to stimuli and transmit nervous impulses, thus regulating muscular and organic action. It unites all body activities, and upon it depend all states of consciousness. The nervous system consists of highly specialized cells and conduction elements that arise from these cells. A nerve cell with its processes is called a **neuron**.

The structure of the neuron. Each neuron is composed of: (1) a cell body, and (2) a cell process.

1. The **cell body**, or nerve cell, consists, like all other human body cells, of protoplasm with a large nucleus and, usually, a well-defined nucleolus. Nerve cells have a definite structure which enables them to perform a definite function. The **qualities** of a nerve cell are sensitiveness and speed of action. The ability to store and transmit energy is inherent in the protoplasm of the nerve cell. Nerve cells are never formed in the human body after the age of about three years, and they do not regenerate if destroyed by injury or disease. Nearly all the nerve cells of the human body are contained in the **brain** and **spinal cord**. Outside these organs are found small groups or masses of cells called **nerve centers**, which specialize in performing a particular function. Other masses of nervous matter, including nerve cells, are called **ganglia**. Such a mass, or ganglion, is bound together by connective tissue and usually forms an enlargement in the course of a nerve bundle.

2. The **cell process** is an outgrowth of the cell body. The single cell body in the brain or spinal cord sends out long, protoplasmic processes called "axons" and "dendrites." The **axon** is the axis cylinder of a nerve fiber; the **dendrites** branch

and interlace with the processes of other nerve cells. The cell process makes connection with a muscle, an organ of feeling on the surface of the body, or another nerve cell. If injured or destroyed by disease, the process may be regenerated if its cell body is intact.

Classifications of neurons are:

1. **Sensory or afferent.** Long cell processes, the sensory nerve fibers, carry impulses toward the brain and spinal cord (the central nervous system). The sensory cells are located within the sense organs; they receive sensations of sight, hearing, touch, and so forth, which they transmit to the nerve center. The information which the body receives is the effect of stimuli upon the terminals of sensory nerves or upon the sensitive outer ends of sensory cells.

2. **Motor or efferent.** These processes (axons) extend to the muscle fibers and gland cells. The motor impulse travels along the motor nerve fiber and causes a muscle to contract or a gland to secrete.

3. **Intermediate.** These neurons have no contact with the outside world. Incoming and outgoing neurons communicate at one end with a cell body, but the dendrites and axons of intermediate, or association, neurons are in touch only with efferent and afferent units, which they connect.

Nerve fibers. A nerve fiber is a cell process with its covering or sheath. Each fiber consists of a central axis or thread of protoplasm, which is the process of a nerve cell. Bundles of round or flattened fibers form a **nerve**, which is a cordlike band or filament of nervous tissue. The function of the nerves is to convey impulses from one part of the body to another. When a nervous impulse arrives at the cell body in the brain or cord, the fiber will split to make connection with one or more central nerve cells, which relay the information to the fibers that carry the motor impulses. Each bundle of fibers is enclosed in a connective tissue sheath, the various bundles being separated by connective tissue which is supplied with the **blood vessels** and **lymphatics** from which the nerve tissues

receive nourishment. In man, nerve fibers are classified as (1) medullated, and (2) nonmedullated.

1. A **medullated fiber** consists of a central core, that is, the nerve fiber proper, which sometimes is enclosed in a sheath surrounded by a layer of white fatty material called the **myelin sheath**. This, in turn, is enclosed in a primitive sheath. From myelin, which is a white substance, the term "**white matter**" originated. The sheath is interrupted at intervals by constrictions called **nodes of Ranvier**.

2. **Nonmedullated fibers** appear gray, as the myelin sheath is absent. Hence the term "**gray matter**" for describing these fibers.

The Divisions of the Nervous System

I. **The cerebrospinal nervous system.** Through this system all impulses to the voluntary muscles must pass. Making up this large system are:

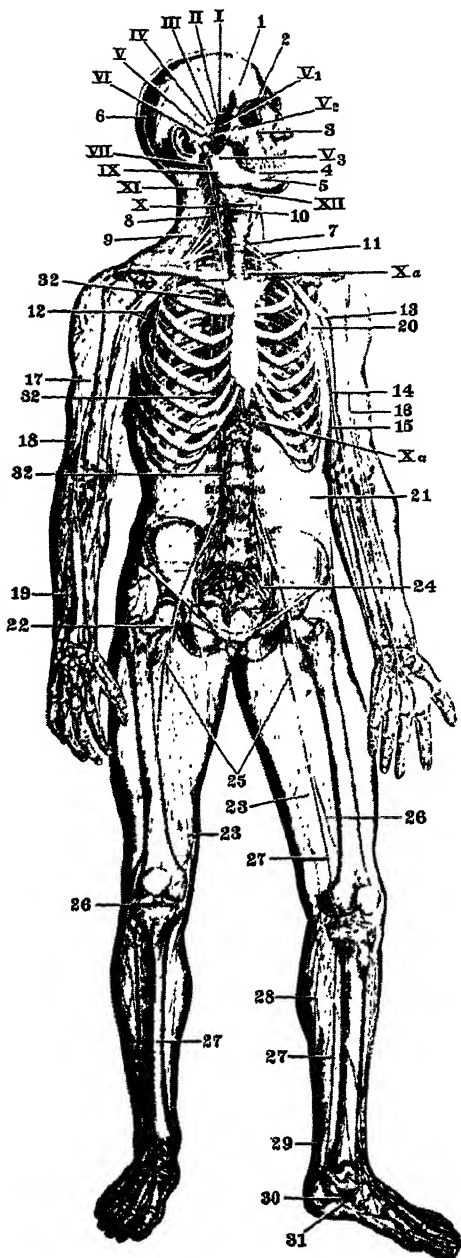
1. **The central nervous system**, comprising the brain and spinal cord. The brain is the origin of the cranial nerves, and in the spinal cord the spinal nerves have their beginning.

2. **The peripheral nervous system**—comprising the nerves themselves—transmits sensory impulses to the spinal cord and brain, and motor impulses to the sense organs.

II. **The sympathetic or autonomic nervous system.** This is the system which directs the involuntary muscles—those of breathing, circulation, digestion, and so forth. It also takes the place of the cerebrospinal nervous system during anesthesia and sleep. The sympathetic system is an outgrowth of the central system, beginning in two rows of ganglia located along the spinal cord, and is controlled by the central system.

The Spinal Cord and Brain

Dominating the nervous system, physiologically, are the spinal cord and the brain. At the bottom of the central nervous system is the **spinal cord**, composed of masses of nerve cells with fibers running upward and downward. These fibers carry impulses to cell bodies and other impulses away from



- I. Olfactory nerve (of smell)
- II. Optic nerve (of vision)
- III. Oculomotor nerve
- IV. Trochlear nerve
- V. Trigeminal nerve
 - V₁. Ophthalmic
 - V₂. Maxillary
 - V₃. Mandibular
 } Division of the trigeminal nerve
- VI. Abducent nerve
- VII. Facial nerve
- IX. Glossopharyngeal nerve
- X. Right vagus nerve
- X_a. Left vagus nerve
- XI. Accessory nerve
- XII. Hypoglossal nerve
 - 1. Supraorbital nerve
 - 2. Frontal nerve
 - 3. Infraorbital nerve
 - 4. Lingual nerve
 - 5. Mental nerve
 - 6. Major occipital nerve
 - 7. Left phrenic nerve
 - 8. Right phrenic nerve
 - 9. Dorsal nerve of scapula
 - 10. Superior laryngeal nerve
 - 11. Brachial plexus
 - 12. Subscapular nerve
 - 13. Axillary nerve
 - 14. Median nerve
 - 15. Ulnar nerve
 - 16. Radial nerve
 - 17. Posterior cutaneous nerve of arm
 - 18. Dorsal cutaneous nerve of forearm
 - 19. Dorsal interosseous nerve
 - 20. Intercostobrachial nerve
 - 21. Twelfth intercostal nerve
 - 22. Femoral nerve
 - 23. Saphenous nerve
 - 24. Sacral plexus
 - 25. Sciatic nerve
 - 26. Common peroneal nerve
 - 27. Tibial nerve
 - 28. Medial cutaneous nerve of calf
 - 29. Sural nerve (nerve of calf)
 - 30. Medial plantar nerve
 - 31. Lateral plantar nerve
 - 32. Sympathetic trunk

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FIG. 8. THE NERVOUS SYSTEM.

them. The spinal cord is enclosed in a canal (the spinal canal) formed by the vertebrae. The **brain**, an enlargement of the cord, is the largest mass of nerve tissue contained in the cranium. The average **weight** of an adult brain is from 44 to 48 ounces. The upper and front part of the brain is called the **cerebrum** and the smaller and lower part the **cerebellum**. The **medulla oblongata** is the part attached to the spinal cord and is directly continuous with the spinal cord.

Twelve pairs of **cranial nerves** arise from the brain and the upper end of the spinal cord. They are distributed, with certain exceptions, to parts of the head; only their branches are found in the face. Some are nerves of sensation (sensory), some are nerves of motion (motor), while others are of both types.

The **spinal nerves** leave the cord in thirty-one pairs. They supply the muscles and skin of the trunk and limbs, and connect with the nerves of the sympathetic system.

Nerves may be stimulated by the application of heat, electric currents, massage manipulations, and chemical irritants, such as salts, alkalis, and acids.

Cranial Nerves

The twelve pairs of cranial nerves arise from the cranium in the following order:

1. **Olfactory**—Distribution: the nasal mucous membrane.
2. **Optic**—Distribution: the retina of the eye.
3. **Oculomotor**—Distribution: nearly all the muscles of the eye.
4. **Trochlear**—Distribution: the superior oblique muscle of the eye.
5. **Trigeminal**, or **trifacial**—Distribution: the skin of the face, the tongue, and the teeth.
6. **Abducent**—Distribution: the external rectus muscle of the eye.
7. **Facial**—Distribution: the face and scalp, palate, tongue, and ear.
8. **Auditory**—Distribution: the cochlea, vestibule, and body canals of the ear.

9. **Glossopharyngeal**—Distribution: the middle ear, pharynx, meninges, tonsils, and tongue.

10. **Pneumogastric, or vagus**—Distribution: the larynx, lungs, heart, and so forth.

11. **Spinal Accessory**—Distribution: sterno-cleido-mastoid, mastoid, trapezius, larynx, and pharynx.

12. **Hypoglossal**—Distribution: the hypoglossus and sub-hyoid muscles.

These cranial nerves are also known as *first cranial*, *second cranial*, and so forth.

Nerves of the Head and Neck

(Refer to the accompanying chart.)

1. **Auricularis magnus, or great auricular**—A sensory nerve with distribution to the face, ear, neck, and the parotid (the largest salivary) gland.

2. **Superficial cervical**—A sensory and motor nerve with distribution to the skin and muscles on each side of the neck.

3. **Occipitalis minor, or lesser occipital**—A sensory nerve with distribution to the parts behind the ear.

4. **Great occipital**—A sensory and motor nerve with distribution to the muscle of the side of the back of the neck, the broad muscle of the back of the neck, and the scalp muscle.

5. **Post auricular**—A motor nerve with distribution to the *retrahens aurem* and *occipito frontalis*.

6. **Infra-maxillary, or mandibular**—A sensory and motor nerve with distribution to the teeth, the muscles of the lower jaw, the lower lip and lower part of the face, and the mucous membranes of the front of the tongue.

7. **Supra-maxillary**—A sensory nerve with distribution to the face and teeth.

8. **Buccal**—A sensory nerve with distribution to the cheek, buccinator muscle, and so on.

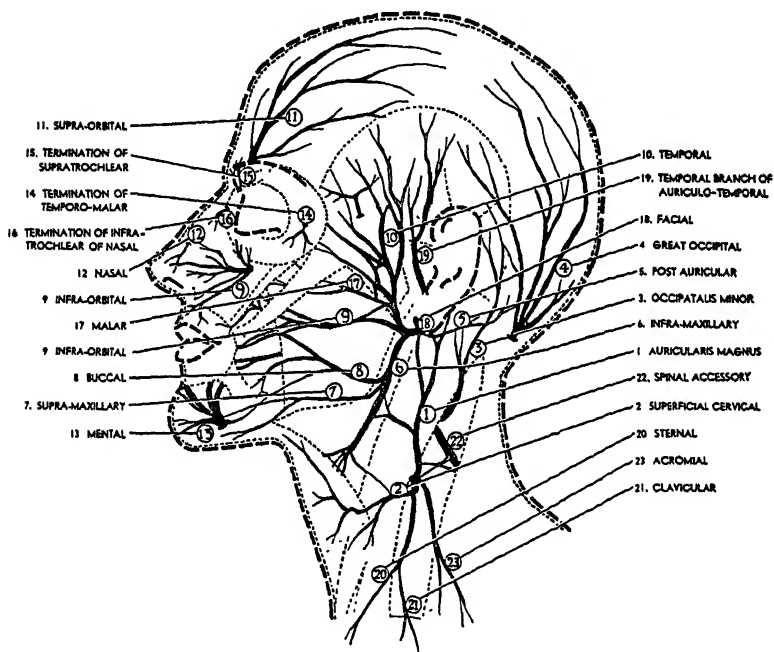
9. **Infra-orbital**—A sensory nerve with distribution to the cheek, nose, and upper lip.

10. **Temporal**—A sensory nerve with distribution to the skin over the temporalis muscle.

11. **Supra-orbital**—A sensory nerve with distribution to the upper eyelid, forehead, scalp, and periosteum of the cranium.

12. **Nasal**—A sensory nerve with distribution to the septum and the wall of the nasal fossa.

13. **Mental**—A sensory and motor nerve with distribution to the skin and mucous membranes of the lower lip and each side of the chin.



Courtesy of "Modern Beauty Shop Magazine."

FIG. 9. NERVES OF THE HEAD AND NECK.

14. Termination of temporo-malar.

15. **Supratrochlear**—A sensory nerve with distribution to the upper eyelid and forehead.

16. **Infratrochlear**—A sensory nerve with distribution to the skin of the nose and the structures of the inner angle of the eye.

17. **Malar**—A motor nerve with distribution to the corrugator supercili, the orbicularis palpebrarum, and the eyelids.

18. **Facial**—A sensory and motor nerve with distribution to the muscles of the face, ear, salivary glands, and tongue.

19. **Auriculo-temporal**—A sensory nerve with distribution to the temple and pinna.

20. **Sternal, or anterior supra-clavicular**—A sensory nerve with distribution to the skin of the neck and chest.

21. **Clavicular, or middle supra-clavicular**—A sensory nerve with distribution to the skin of the neck, chest, and shoulder.

22. **Spinal accessory**—A motor nerve with distribution to the sterno-cleido-mastoid, trapezius, larynx, and pharynx.

23. **Acromial, or posterior supra-clavicular**—A sensory nerve with distribution to the skin of the upper and back parts of the shoulder.

Principal Nerves of the Arm and Hand

1. **Median**—A nerve of sensation and motion which passes down the middle of the arm and distributes branches to the palm and fingers.

2. **Interosseus:**

a. **Anterior**—A motor nerve with distribution to the deep muscles on the palmar side of the forearm.

b. **Posterior**—A sensory and motor nerve with distribution to the back of the forearm and wrist.

3. **Radial**—A sensory and motor nerve with distribution to the back of the arm and forearm, and the skin of the back of the hand.

4. **Ulnar**—A sensory and motor nerve with distribution to the muscles of the shoulder joint, wrist joint, and the skin of the wrist, palm, and little finger.

Questions

1. What does the nervous system include?
2. What is the function of the nervous system?
3. Of what does the nervous system consist?
4. What is a nerve cell with its processes called?
5. Of what is a neuron composed?

6. Of what does the cell body consist?
7. What are the qualities of a nerve cell? Will a nerve cell regenerate if destroyed?
8. Are nerve cells formed throughout the life of an individual?
9. Where are nearly all the nerve cells of the body contained?
10. What are nerve centers? Where are they found?
11. What are ganglia?
12. What is the cell process?
13. What is an axon?
14. What is a dendrite?
15. Will the cell process be regenerated if injured or destroyed by disease?
16. How are neurons classified?
17. Describe sensory, or afferent, neurons. What sensations do they carry?
18. Describe motor (efferent) neurons.
19. What organs of the body do the motor nerves supply?
20. Describe intermediate neurons.
21. Do intermediate neurons have any contact with the outside world?
22. What is a nerve fiber?
23. Define a nerve.
24. What is the function of the nerves?
25. How are the bundles of nerve fibers enclosed?
26. How do nerve tissues receive nourishment?
27. What takes place when a nervous impulse arrives at the cell body in the brain or cord?
28. How are nerve fibers classified?
29. What is meant by the *myelin sheath*?
30. What are the nodes of Ranvier?
31. Why do nonmedullated fibers appear gray?
32. Name the divisions of the nervous system.
33. What type of muscles does the cerebrospinal system direct?

34. What are the two divisions of the cerebrospinal nervous system?
 35. Name the two important organs of which the central nervous system consists.
 36. What is the function of the peripheral nervous system?
 37. What muscles does the sympathetic nervous system direct?
 38. Where does the sympathetic nervous system originate?
 39. What are the two principal organs of the nervous system?
 40. Discuss the composition of the spinal cord.
 41. How is the spinal cord enclosed and protected?
 42. Of what kind of tissue is the brain composed?
 43. Name the principal parts of the brain.
 44. How many pairs of cranial nerves are there? Where are they distributed?
 45. How many pairs of nerves leave the spinal cord? What parts of the body do they supply?
 46. How may nerve tissues be stimulated artificially?
 47. How are the cranial nerves numbered?
 48. Name the cranial nerves and give the distribution of each.
 49. Name the nerves of the head and neck and give the distribution of each.
 50. Name the principal nerves of the arm and hand and give the distribution of each.
-

Chapter VII

THE CIRCULATORY SYSTEM

The **circulatory system**, also called the *blood-vascular system*, is a system of tubes and spaces which conveys a fluid, the blood, to all parts of the body. These tubes, with a few exceptions, are closed. The three principal divisions of the circulatory system are: (1) the heart, (2) the blood vessels, and (3) the blood.

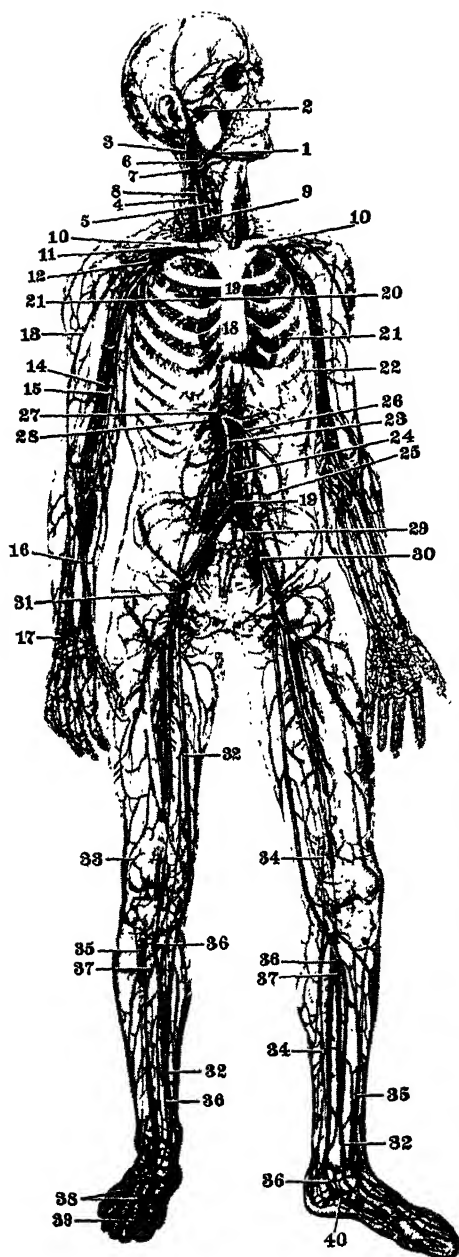
The course of the blood through the heart, arteries, capillaries, and veins is called its **circulation**. The pulsations of the heart force the blood through the blood vessels, a secondary factor being the propagating action of the arteries, which are not rigid tubes, but are composed of soft extensible tissue. By contraction of their walls, the arteries send some of the blood into the next segment of the system. This causes a wave of distention which extends even to the smallest capillary filaments. In this way the blood is kept moving during diastole, or while the heart is at rest, thus relieving the heart during each systole, the period of the heart's contraction.

The expansion and contraction of an artery, usually felt on the radial artery of the wrist, is called the **pulse**. Its rate (the number of pulsations per minute) varies in an adult from 67 to 72. Fifteen pints of blood fill the blood vessels of an adult and constitute about **one-sixteenth** of the body's weight.

The Circulation of the Blood

The blood vessels of mammals form two chief groups or systems: (1) the pulmonary system, and (2) the systemic system.

1. The **pulmonary system**, the smaller of the two, includes the pulmonary veins, the capillaries of the lungs, and the pulmonary artery. The blood passes from the right ventricle



1. External maxillary facial artery and anterior facial vein
2. Middle meningeal artery
3. External jugular vein
4. Vertebral artery
5. Common carotid artery
6. External carotid artery
7. Internal carotid artery
8. Internal jugular vein
9. Bulb of internal jugular vein
10. Sub-clavian artery
11. Sub-clavian vein
12. Axillary artery and vein
13. Cephalic vein
14. Brachial artery
15. Basilic vein
16. Radial artery
17. Ulnar artery
18. Heart
19. Aorta
20. Superior vena cava
21. Pulmonary artery
22. Intercostal artery (anterior branch)
23. Superior mesenteric artery and vein
24. Inferior mesenteric artery
25. Sigmoid artery and vein
26. Inferior mesenteric vein
27. Portal vein
28. Right renal artery and vein
29. Common iliac artery and vein
30. External iliac artery and vein
31. Femoral artery and vein
32. Large saphenous (internal) vein
33. Lateral superior artery of knee—superior external articular artery
34. Small (external) saphenous vein
35. Anterior tibial artery and vein
36. Posterior tibial artery
37. Peroneal artery
38. Dorsal metatarsal arteries; interosseus arteries
39. Dorsal digital arteries
40. Medial plantar artery, internal plantar artery

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FIG. 10. THE CIRCULATORY SYSTEM.

through the pulmonary artery to the lungs. The function of the pulmonary system is to reoxygenate the blood (renew its supply of oxygen) and dispose of the carbon dioxide the blood has brought from the body tissues. After being purified in the lungs, the blood passes into the pulmonary veins and is carried back to the heart.

2. The **systemic system** carries blood from the heart to all parts of the body. The systemic system includes:

- a. The aorta and all its branches.
- b. The capillaries of the body organs and tissues.
- c. The venous system which returns the blood to the heart.

Functions of the Blood

1. To carry food and oxygen to body cells.
2. To carry carbon dioxide and waste products to the organs of elimination.
3. To carry the hormones from the glands of internal secretion to their bases of activity.
4. To regulate the salt content and the water balance of the body.
5. To carry substances for the resistance of disease and infection.
6. To distribute the heat generated in one part of the body to all parts equally.¹
7. To coagulate and prevent its own loss through hemorrhage. The clot itself is composed of *fibrin*, which, by the action of a ferment, *thrombin*, is converted into a threadlike mass which traps in its meshes cells and plasma. If the clot stands for several hours, a clear amber liquid may seep out, leaving a mass of fibrin and cells. This liquid is the **blood serum**.

The composition of the blood. Blood is a red, opaque, salty, sticky fluid which contains so many cells that it is classified as a tissue. It consists of (1) blood plasma, (2) red cells, (3) white cells, and (4) blood platelets.

¹ The normal body temperature of 98.6° F. is the result of the balance between heat production and heat loss.

1. The plasma is a yellowish fluid which forms from one-half to three-fifths of the volume of the blood. It is composed of:

- a. Water—80 per cent.
- b. Proteins, carbohydrates, and fats.
- c. Salts.
- d. Gases: oxygen, carbon dioxide, and nitrogen.
- e. Secretions from endocrine glands.
- f. Antibodies.
- g. Blood proteins.
- h. Waste substances.
- i. Antithrombin and prothrombin.

2. The red blood cells, or erythrocytes, are the predominant cells. The origin and disposal of both kinds of cells take place outside the blood stream. The red cells are formed in the bone marrow, and when they die, their bodies are carried to the spleen and liver, where they are broken up and their chemical substances stored, to be used over again for other body needs. From three to five weeks has been given as their average term of life; they are dying by countless millions every 24 hours, and are being as rapidly replaced. As they are without nuclei, the red cells cannot divide and multiply, but in other respects they resemble a typical living cell. They contain a small amount of iron, present in the hemoglobin, which, in consequence of its peculiar structure, is able to take up oxygen and store it until the time arrives to give it up to the tissues. The primary function of the red cells is to supply oxygen. The color of the red cells is due to the combination of the hemoglobin and oxygen. The blood appears red when the cells are seen in large numbers; an individual cell is of an orange-yellow hue. The color also changes from the bright red of oxygen-bearing arterial blood to the darker fluid, laden with carbon dioxide, that circulates in the veins. A deficiency of red cells, or a decrease in the amount of hemoglobin, may result in anemia.

3. The white blood cells are of several varieties, some of which are called mononuclear leukocytes, polymorphonuclear leukocytes, and lymphocytes. Many of them are larger than

the red cells, and all of them have nuclei. They are capable of ameboid movement, and pass through the capillary walls to wander independently in the tissue spaces. Their function appears to be protective and healing. Some of them are called *phagocytes*, as they perform *phagocytosis*, which consists of the enveloping and absorbing of living or dead bacteria, as well as other particles, such as disintegrated red blood cells or the fragments of a damaged tissue or nerve filament. The white cells also prepare substances which immunize the body against poisons produced by bacteria. Another important function is to congregate in large numbers at the site of infections and aid in the clotting of the blood. Some of the white cells are formed in the bone marrow and some in the lymph glands. Like the red cells, some are disposed of in the liver and spleen. The determining of the number of white cells in the blood count is an important aid in the diagnosis of disease caused by bacterial infection.

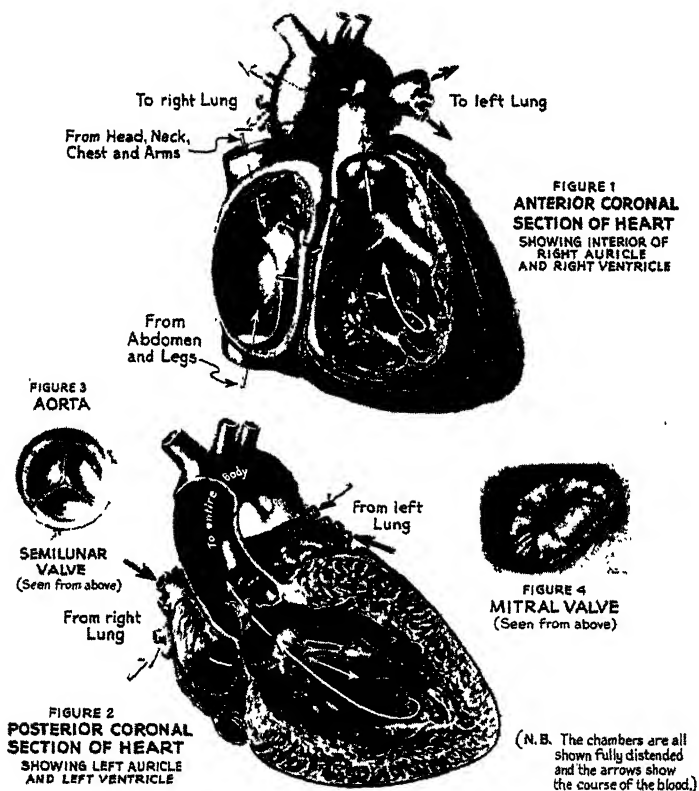
4. The blood platelets are oval bodies, much smaller than the red cells. Their exact composition is not known. They adhere to injured surfaces and liberate a substance that plays an important part in the clotting of the blood.

The Heart

The heart is the hollow muscular structure which, by contraction and dilation, propels the blood through the circulatory system. The adult human heart is cone-shaped, about five inches long, three and one-half inches wide, and two and one-half inches thick. Made up, generally, of cardiac muscle, it lies in the thorax, between the lungs, and is enveloped in a protective membranous sac, the *pericardium*, which prevents its over-distention.

The heart cavity is divided into two parts, separated by a septum. The two halves do not communicate, but they function simultaneously. Each half consists of two chambers lined with a delicate membrane, the *endocardium*. This lining is covered with an outer layer of heart muscle. The two upper and receiving chambers are called *auricles*; the two lower and discharging chambers, *ventricles*. Impure blood flows from

each auricle into the ventricle below it. In the openings are valves which prevent the return of blood into the auricles when the ventricles contract (the tricuspid and mitral valves), and other valves which prevent its return from the arteries when the ventricles relax again (the semilunar valves).



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FIG. 11. THE HEART.

The function of the heart is to keep the blood moving from one region to another. When the venous blood arrives at the heart, it must be sent to the lungs to liberate its carbon dioxide

and to be reoxygenated by the air in the lung chambers. Although the heart beats rhythmically, the blood does not flow at an equal rate in all the vessels. It is rhythmic in the arteries, but it is continuous in the veins and the capillaries.

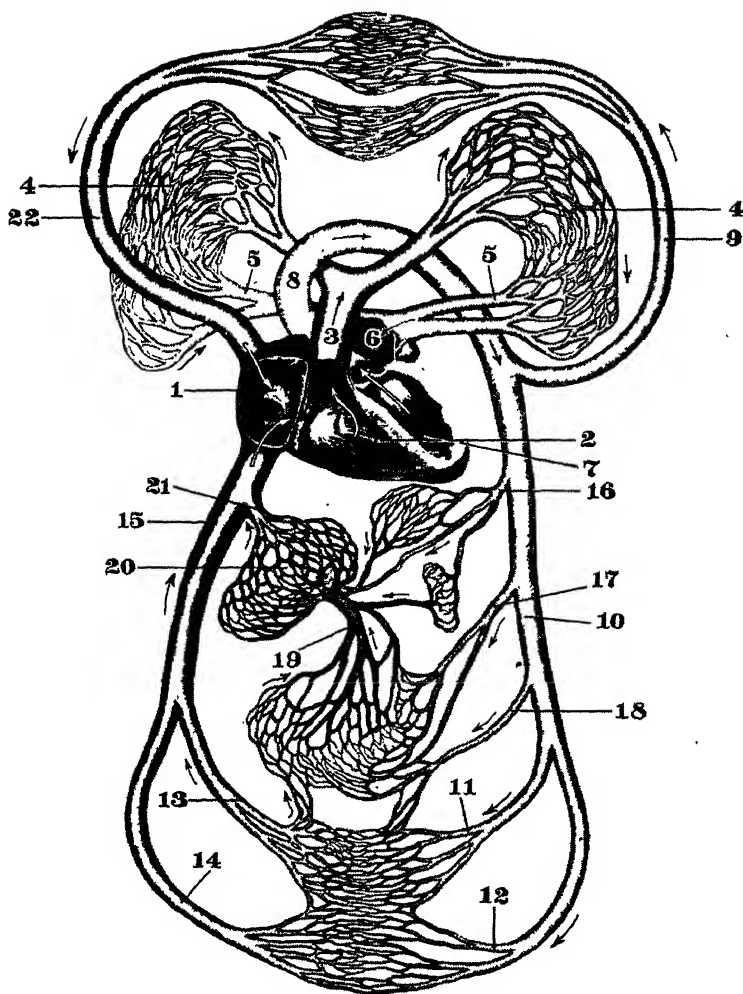
The Blood Vessels

The vessels of the circulatory system have a total length of one hundred thousand miles in an adult. Their function is to transport blood—to serve food and oxygen to millions of individual body cells.

Blood vessels are classified as follows:

1. **Arteries**, which carry blood from the heart, their branches subdividing into capillaries. Arterial walls are thick and elastic. Their three coats, or layers, contain yellow elastic fibers which withstand changes in pressure, white fibers which give strength to the walls, and muscle fibers which regulate, by contraction and expansion, the quantity of blood sent to any tissue. Two great arteries leave from the lower chambers of the heart. From the right ventricle the venous blood passes through the pulmonary artery to the lungs, where it is oxygenated. The oxygenated blood flows out into all parts of the body through the aorta, the largest artery, which arises from the left ventricle. The aorta has three main divisions which branch to form smaller and smaller vessels with progressively thinner walls. The smallest arteries, before they break up into capillaries, are called **arterioles**. An artery which does not divide into branches, but terminates directly in capillaries, is called a **terminal artery**.

2. **Capillaries** carry blood from the arterioles to the venules (minute veins). The capillaries are hairlike in size and are very numerous, forming networks in nearly all tissues. Oxygen and food in solution seep through their walls, which consist of a single layer of cells, the endothelium. This oxygen and food then passes, by way of the lymph plasma, through the permeable walls of the cells and becomes part of the substance. In the same manner, waste products and carbon dioxide pass from the cells into the lymph plasma to be sent back to the blood.



Reduction of Frohse Anatomical Wall Charts by permission of A. J. Nystrom & Co., Chicago.

- | | |
|--|--------------------------------|
| 1. Right forechamber | 12. Arteries of lower limb |
| 2. Right ventricle | 13. Hypogastric vein |
| 3. Pulmonary artery | 14. Veins of lower limbs |
| 4. Capillary circulation of lung | 15. Inferior vena cava |
| 5. Pulmonary veins | 16. Coeliac artery |
| 6. Left forechamber | 17. Superior mesenteric artery |
| 7. Left ventricle | 18. Inferior mesenteric artery |
| 8. Aortic arch | 19. Portal circulation |
| 9. Arteries of the head and upper limb | 20. Capillaries of the liver |
| 10. Descending aorta | 21. Hepatic veins |
| 11. Hypogastric artery | 22. Superior vena cava |

FIG. 12. SCHEMA OF CIRCULATION.

3. **Veins** are vessels which convey blood to or toward the heart. Their outer coats are thinner than those of the arteries. As there is no pressure in the veins, the blood moves more slowly here than in the arteries. Small veins combine to form larger ones as they return to the heart filled with venous blood which is to be oxygenated, or purified, in the lungs. The impure blood from the head and upper part of the body is returned to the upper part of the right auricle through the superior vena cava, and the blood from the lower parts of the body to the lower part of the right auricle through the inferior vena cava. Many veins are supplied with **valves**, which prevent an abnormal backward flow of blood into the capillaries.

Arteries of the Head and Neck²

(Refer to the chart on page 56.)

A. Common carotid, external and internal—The two great arteries on either side of the neck. Distribution: head and neck.

B. Facial, or external maxillary—Distribution: pharynx, lower jaw, lip, nose, orbit, and lachrymal sac.

C. Angular—Distribution: lachrymal sac and inferior portion of orbicularis palpebrarum.

D. Superficial temporal—Distribution: forehead, masseter muscle, and the ear.

E. Transverse facial—Distribution: parotid gland, masseter muscle, and skin of the face.

F. Orbital—Distribution: the orbit (eye cavity).

G. Anterior temporal—Distribution: temporal muscle and malar bone.

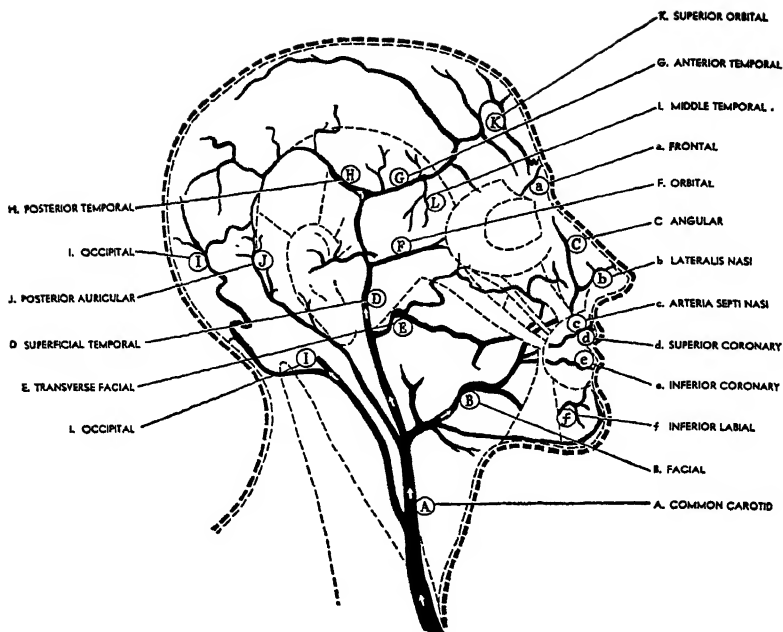
H. Posterior temporal—Distribution: temporal fossa.

I. Occipital—Distribution: the muscles of the scalp and neck.

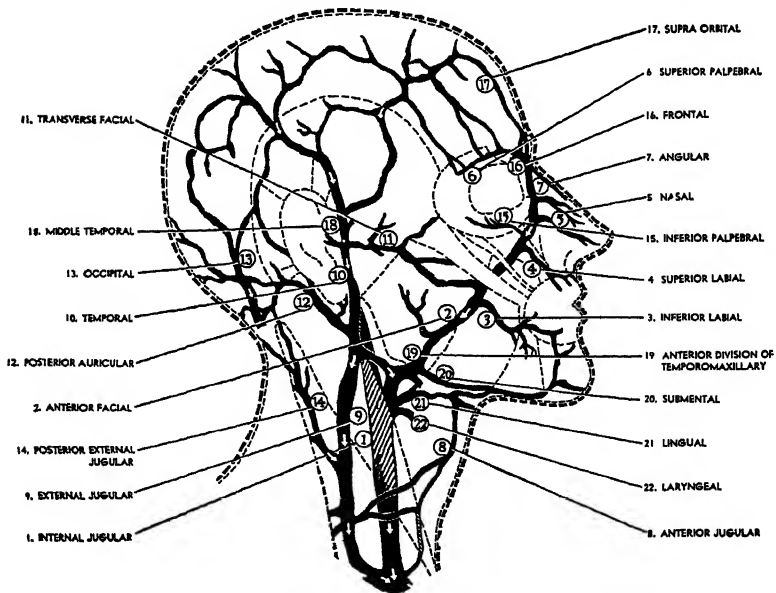
J. Posterior auricular—Distribution: middle ear, auricle, parotid gland, digastric, and other muscles.

K. Superior orbital—Distribution: the orbit and surrounding parts.

² Arteries *B* to *L* and *a* to *f*, inclusive, are branches of the external carotid artery.



ARTERIES



VEINS

Courtesy of "Modern Beauty Shop Magazine."

FIG. 13. BLOOD VESSELS OF THE HEAD AND NECK.

- L. Middle temporal**—Distribution: temporal fascia muscle.
- a. Frontal*—Distribution: anterior part of the scalp.
 - b. Lateralis nasi*—Distribution: the nostrils.
 - c. Arteria septi nasi*—Distribution: the nose.
 - d. Superior coronary*—Distribution: the upper lip and septum nasi.
 - e. Inferior coronary*—Distribution: the lower lip.
 - f. Inferior labial*—Distribution: the lower lip.

Veins of the Head and Neck

(Refer to the accompanying chart.)

- | | |
|-------------------------|---|
| 1. Internal jugular | 13. Occipital |
| 2. Anterior facial | 14. Posterior external jugular |
| 3. Inferior labial | 15. Inferior palpebral |
| 4. Superior labial | 16. Frontal |
| 5. Nasal | 17. Supra orbital |
| 6. Superior palpebral | 18. Middle temporal |
| 7. Angular | 19. Anterior division of temporomaxillary |
| 8. Internal jugular | 20. Submental |
| 9. External jugular | 21. Lingual |
| 10. Temporal | 22. Laryngeal |
| 11. Transverse facial | |
| 12. Posterior auricular | |

The jugular veins of the neck return the blood from the head. They form the subclavian veins which empty into the innominate veins. The blood from the head and neck finally enters the superior vena cava and enters the right auricle of the heart.

Arteries and Veins of the Upper Extremities

Branches of the subclavian artery supply the arm and hand. They are:

- 1. **Axillary**—Distribution: the upper extremities, including the side of the chest and shoulder.
- 2. **Brachial**—Distribution: shoulder, arm, forearm, and hand, dividing into:
 - a. Ulnar*—Distribution: elbow, forearm, wrist, hand, and fingers.
 - b. Radial*—Distribution: forearm, wrist, and hand.

Principal veins of the upper extremity are:

1. **Subclavian**—Continues the axillary vein as the main venous stem of the upper extremity.
2. **Cephalic**—Arises at the elbow, passes along the lateral border of the biceps muscle, and empties into the axillary vein.
3. **Basilic**—Vein of the upper arm, lying along the border of the biceps muscle.
4. **Radial**—Passes down the radial side of the forearm.

The Lymphatic System

The lymphatic system is a unique arrangement subsidiary in function to the circulatory system. This system, consisting of lymph, lymphatic vessels, and lymph glands, by means of dialysis (the separation of substances by passage through a porous membrane) fills the spaces (known as lymph spaces) between capillaries and body cells with lymph, a weakly alkaline, colorless, coagulable fluid derived from blood plasma, which supplies food and oxygen to the cells all over the body that are not in direct contact with the capillaries, and which absorbs from the cells waste substances and gases. By means of osmosis (the mixing of two liquids or gases by passage through a porous membrane) these waste materials are transferred to the lymphatic vessels.

Lymph plasma is generally free from red cells but contains colorless corpuscles, the lymphocytes, called "body scavengers," which have the power to absorb harmful bacteria and foreign substances. The quantity of lymph in the body has been estimated to be about 12 to 15 quarts—three times that of the blood. The combined blood and lymph constitute about one-fourth the total body weight.

The lymphatic vessels originate in the tissues, the larger ones resembling veins and having walls composed only of endothelial cells. After draining the tissues, the lymphatics enter the large ducts which empty into the veins. The various lymph vessels from the body below the diaphragm and from the left side of the body above the diaphragm unite into the thoracic, or left lymphatic, duct. The lymphatics from the

right side of the body above the liver unite into the **right lymphatic duct** at the junction of the right subclavian and internal jugular veins.

The **lymphatic glands** or **nodes** are small, spongelike masses of lymphoid tissue. Their function is to filter lymph and to produce lymphocytes to purify it of all bacteria and foreign matter. Lymph glands are always found to be enlarged in the region of an infection. The chief lymph glands are located in the neck, axillae, elbow, groin, and mesentery.

The principal lymph glands which receive lymph from the head are as follows:

1. **Facial glands.**
 - a. Superior group.
 - b. Submaxillary or inferior group.
 - c. Buccinator or middle group.
2. **Posterior auricular glands.**
3. **Internal maxillary glands.**
4. **Occipital glands.**
5. **Parotid and subparotid glands.**

The flow of lymph may be **stimulated** by muscular exercise, deep breathing, electric currents, and massage.

Questions

1. What does the circulatory system include?
2. Describe the circulation of the blood.
3. How is the circulation of the blood accomplished?
4. What is meant by *diastole*? *Systole*?
5. What is the pulse, and what is its rate in an adult?
6. How much of the body's weight is made up by the blood?
7. Name the two systems of the circulatory system.
8. Describe the flow of blood in the systemic system.
9. Describe the flow of blood in the pulmonary system.
10. How may the circulation of the blood be increased?
11. What are the functions of the blood? What is the normal body temperature?

12. What is a blood clot?
13. What is the blood serum?
14. Describe the composition of the blood.
15. Describe the blood plasma.
16. Where do the red blood cells originate? How does the body dispose of them?
17. What is the average length of life of a red cell?
18. Can red cells divide and multiply?
19. What is the function of hemoglobin?
20. What is the principal function of the red cells?
21. To what factor is the color of the red cells due?
22. Is the color of the blood the same in all the blood vessels?
23. Name three varieties of white blood cells.
24. What is ameboid movement?
25. What is the function of the white blood cells?
26. What is phagocytosis?
27. Where are the white cells formed? How does the body dispose of them?
28. What are blood platelets?
29. What part do they play in the clotting of the blood?
30. Describe the heart. Where is the heart situated?
31. What is the pericardium?
32. Into how many chambers is the heart divided?
33. What is the name of the membrane lining the chambers of the heart?
34. What are the two upper chambers called?
35. What are the two lower chambers called?
36. What purpose do the valves of the heart serve?
37. What is the function of the heart?
38. To what class of tissue does heart muscle belong?
39. Is the flow of blood even in all the blood vessels?
40. What is the function of the blood vessels?

41. How are the blood vessels classified?
42. What is the function of the arteries?
43. Describe the structure of the walls of the arteries.
44. Why must arterial walls be strong and elastic?
45. Name the great arteries that leave from the lower chamber of each side of the heart.
46. Name the largest artery in the body.
47. What are arterioles?
48. What is a terminal artery?
49. What is the function of the capillaries?
50. What are venules?
51. How does the food and oxygen in the blood reach body cells?
52. How are the veins formed?
53. What is the function of the veins?
54. For what purpose is the blood carried to the lungs?
55. What is meant by "oxygenated" or pure blood?
56. Name the two large veins that enter the right auricle.
57. What veins enter the heart from the lungs?
58. What purpose do the valves in the veins serve?
59. What is the color of the blood in the veins?
60. Name the two principal arteries that supply blood to the head and neck. Where are they situated?
61. Name the branches of the external carotid artery that are distributed to the head and neck.
62. Give the distribution of the facial artery. Of the occipital artery.
63. Name the principal veins by which the blood from the head and neck is returned to the heart.
64. Name the principal arteries of the upper extremity.
65. Name the principal veins of the upper extremity.
66. Of what does the lymphatic system consist?
67. What is the function of the lymphatic system?
68. Describe lymph plasma. How does lymph plasma nourish body cells?

69. How are waste products eliminated by the lymphatic system?
70. What is meant by dialysis? Osmosis?
71. Why are lymphocytes called "body scavengers"?
72. How much of the body's weight does the blood and lymph constitute?
73. Name the two large lymphatic ducts of the body.
74. What are lymphatic glands and what is their function?
75. Name the principal lymph glands which drain the head.
76. How may the flow of lymph be stimulated?

Chapter VIII

THE SKIN

Structure of the Skin

The **skin** is the outer integument, or covering, of the body. It receives its nourishment from the blood in the same manner as any organ of the body, and, because its functions are necessary for the maintaining of body health, it is classified as a **body organ**. The appendages of the skin are the sweat and oil glands, the hair, and the nails. The skin is made up of several very thin layers which are grouped into two principal layers: the **epidermis** (cuticle) and the **corium** (dermis, or true skin). A layer of loose, fatty tissue below the corium is called the **subcutis**.

The **epidermis** is composed of epithelial tissue (epithelium), which is always found in membranes or sheets in which closely adhering cells are separated only by tiny spaces filled with a clear liquid (intercellular fluid). Epithelial tissue forms the glands and also the hair and nails. The epidermis has been called the important part of the skin, as it performs most of the important functions. It is without blood or lymph vessels, and for its nourishment it depends upon the seepage of fluids from the tissues beneath. The **thickness** of the epidermis varies as it is modified to perform special functions. There are more layers on the palms of the hands and the soles of the feet than on other parts of the body, while the thin membrane of the eye consists of but few layers of cells. The **growth** of the epidermis is a continuous process of physical and chemical change. The living cells of the deepest layer flatten, harden, and die as they are pushed upward to the surface of the skin. The epidermis is generally described as being made up of **four layers**:

1. **Stratum corneum**, an outer layer of horny cells. This is the "scarf skin," the cells of which are being constantly shed,

sometimes visibly, as dandruff on the scalp, but generally unnoticed and invisibly to the naked eye. The living protoplasm that filled the cell when it originated in the germinative layer has been replaced by almost pure horn, or keratin. **Keratin** is formed from the bodies of the cells themselves; it is a nitrogenous substance which forms the chemical basis of all epidermal tissues: horn, hair, nails, feathers, and the like. It exists apparently in several varieties and is so highly resistant to chemical and mechanical attack that it has been called the most

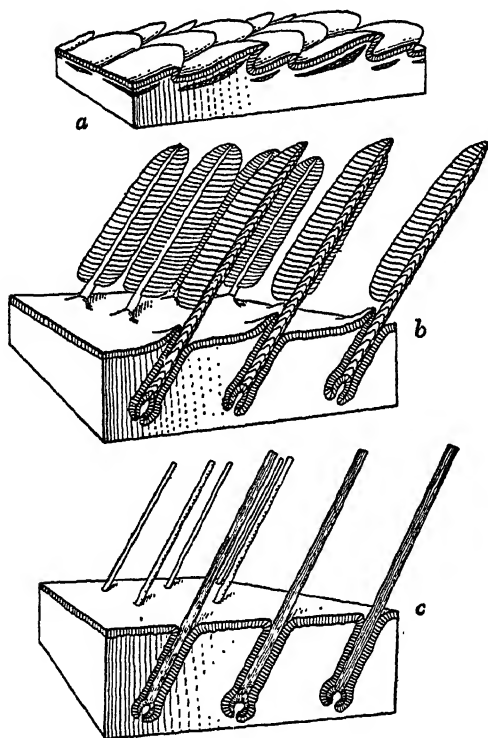


FIG. 14.* (a) Cube cut out of a fish's skin showing the scales below the actual skin. (b) The same from a bird showing the origin of the feathers from the skin. (c) The same from a mammal showing hair formation.

* From *Ascaris, the Biologist's Story of Life*, by Richard Goldschmidt, New York, Prentice-Hall, Inc., 1937, page 84.

indestructible substance in the animal and vegetable world. The horny cells of the stratum corneum interlock and overlap to form a tough, nonconducting coat which excludes bacteria and irritating substances. During the process of changing from living cells to dead ones, a waxlike substance called **horn-fat** is produced. The functions of horn-fat seem to be the same as those of sebum, the secretion of the sebaceous glands.

2. **Stratum lucidum**, an irregular layer of transparent dead cells whose nuclei have begun to disappear, and whose granules have begun to fuse into horn.

3. **Stratum granulosum**, the granular layer. The cells become smaller and flatter, their nuclei lose their stain, and in the clear liquid of the cytoplasm granules begin to form. This is the first stage in the production of horn.

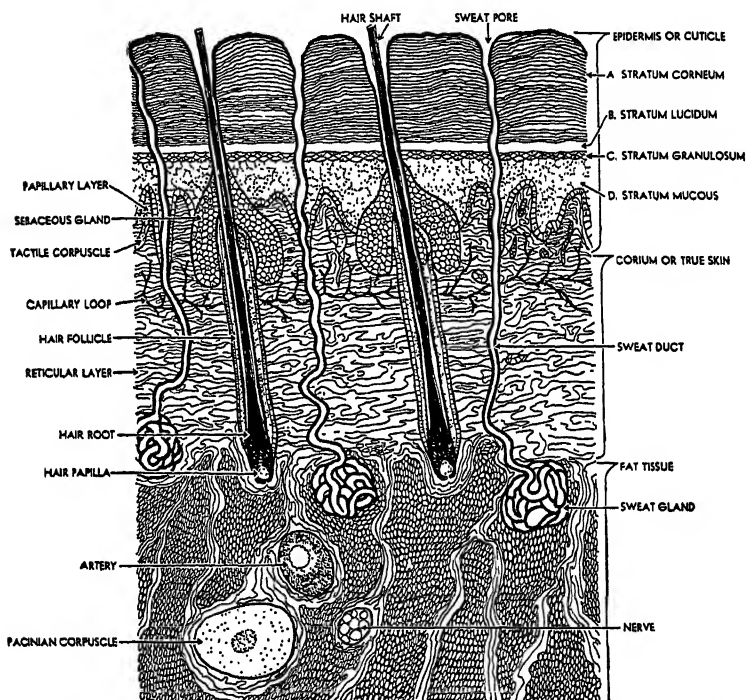
4. **Stratum mucosum**¹ or **Malpighian**, the germinative or basal layer. It rests upon the corium, and its pigmented, columnar cells extend downward to fit among the papillae of the corium, firmly attaching the two layers together. Soft living cells multiply and push upward into the granular layer, where they undergo the first changes in their cytoplasm and nuclei. The Malpighian layer contains the pigment cells which carry the coloring matter of the skin. In the skin of dark races this layer is thicker and the cells contain more grains of coloring matter than in the skin of fair races. When an injury to the skin occurs, it is this layer which, by rapid cell-multiplication, repairs the wound.

The **corium** is made up of dense connective tissue, the fibers of which, both white and yellow, make it a tough and elastic membrane. It contains blood vessels, nerves, sweat and oil glands, hair follicles, and the *erectores pili* muscles. The corium is composed of two layers:

1. The **papillary layer** lies directly beneath the lowest layer of the epidermis. Its surface is covered with nipplelike elevations, the papillae, which extend upward and provide the

¹ The mucous layer has been differentiated from the Malpighian by some writers who describe it as "a continuous tough, spongy membrane which serves as a protection to the soft, germinative layer (stratum Malpighii or Malpighian)."

vital germinative layer above with nourishment from encircling blood capillaries, and with nerves for the perception of pain, touch, and temperature sensations. Surface injuries will not cause blood to flow unless the papillae have been reached. Cold or shock will cause the papillae to rise, a condition known as *cutis anserina*, or "goose flesh," which is the result of the contraction of the erector pili skin muscles.



Courtesy of "Modern Beauty Shop Magazine."

FIG. 15. THE SKIN.

2. The reticular layer, just outside the subcutaneous tissue, is largely made up of fibrous bundles. It contains fat cells, blood vessels, lymphatics, and hair follicles.

The subcutis, or subcutaneous tissue, is composed of a network of bundles of connective tissue fibers. The spaces between the fibers contain blood vessels, lymphatics, nerve filaments, deep-seated hair follicles, and generally fat. The subcutis lies between the corium and the deeper tissues.

Blood supply of the skin. Although capillaries branch so closely that it would be impossible to cut the corium without drawing blood, it has been pointed out that the corium possesses no blood vessels for its own use. W. Noel Goldsmith² says:

One can see no blood-capillaries supplying the actual cutis itself apart from the papillae, but only the epidermis and its derivatives. Even the finest arterioles in the upper half of the corium, hitherto looked upon as capillary-like, can contribute little or nothing to the nourishment of the corium, as they are surrounded by a mantle of circular muscle-fibers. Accordingly the true skin receives no arterial blood. For its nourishment it depends on the veins and possibly the lymph vessels.

The largest blood vessels of the skin are found in the palms of the hands, the soles of the feet, and the buttocks. When the vessels are extended with blood, the thickness of the skin is greatly increased. The skin can store up, on occasion, *one-third* of all the blood in the body.

The lymphatics of the skin are found in both surface and deep networks. Lymph plasma supplies skin cells with nutrient materials from the blood.

The nerves of the skin. Tiny branches from the sympathetic nervous system supply the corium and extend between the epithelial cells of the epidermis. Sensory nerves convey sensations of heat, cold, and pain. Secretory nerves stimulate the glands of the skin to activity and help maintain the normal body temperature by controlling the amount of perspiration and oil excreted on the surface. Very fine vasomotor filaments encircle the capillaries and branch off to other capillaries, making a network which, by dilating the vessels and filling them with blood, produces, for example, a blush upon the cheek, or, by constricting the blood vessels, causes the skin to pale.

The muscles of the skin, the *erectores pilorum*, consist of smooth fibers and are found in the corium. They are inserted on the under side of the hair follicle below the sebaceous glands.

² Goldsmith, W. Noel, *Recent Advances in Dermatology*. London: J. & A. Churchill, Ltd., 1936, page 1.

In some places they are missing. They are under the control of the sympathetic nervous system, and their contraction causes the hair to "stand on end."

The functions of the skin are important:

1. **Protective.** The skin protects the tissues from loss of moisture, from invasion from bacteria, from irritation and mechanical injury (friction and blows), and, by its pigment-forming mechanism, from the rays of strong sunlight. Its appendages, the nails, and in some animals the hair (as horns or quills), provide weapons for defense.

2. **Temperature control.** The blood vessels and glands of the skin help the body to keep a constant internal temperature of 98.6° F. Heat liberated by the burning of food substances and by muscular exercise and heat induced by fevers must escape from the body. The evaporation of perspiration serves this end. Heat must be conserved for body warmth; the film of horn-fat and sebum on the surface, and the hair (in animals, fur), which contains a layer of air that forms a nonconducting coat, assist in accomplishing this purpose.

3. **Secretory and excretory.** The skin eliminates, to some extent, waste substances. The secretions of the oil glands keep the surface flexible and smooth, and the sweat glands take water from the blood in the capillaries and pour it out upon the surface. Only a small amount of solid matter is thrown off in the perspiration. Arsenic, lead, iodine, and other substances in solution may sometimes be detected in the sweat.

4. **Sensory.** Nerves of the sympathetic nervous system carry sensations from the outside world to the brain and spinal cord.

5. **Respiratory.** The skin takes in oxygen and gives out carbon dioxide in proportion.

6. **Absorptive.** The epidermis forms an almost impenetrable covering because of its lubricating film of horn-fat and sebum. Although the extent of the absorption of liquids, fats, and gaseous and volatile substances by the skin is subject to controversy, a considerable amount of absorption has been proved.

The skin is exposed to the wear and tear of its environment, and must continuously renew its tissues. This is done through multiplication of cells in the germinative layer of the epidermis. If the skin is torn, bruised, burned, or cut, replacement of the destroyed part is begun immediately. Protective chemicals are produced, and the cells form new fibers which close the opening and leave no evidence of damage done except, perhaps, an area of scar tissue.

Different **texture** (textura, weave) of the skin is found in different races and individuals and even in different parts of the same body. For example, it is thick on elbows and knees, still thicker on the palms and soles, and thin in the linings of the mouth and nose, where it is called mucous membrane (a modification of the true skin). The cells are being renewed and the surface scales shed very rapidly in the skin of infants and children. This accounts for the great differences in the texture of the skin of young and old persons. While the natural texture of the skin cannot be changed, it may be improved by the application of cosmetics and by massage manipulations. It may also be influenced by a systemic disturbance and by exposure to weather. Occupational skin conditions may be caused by irritation or pressure. Friction may cause a thickening of the epidermis resulting in a **corn** or **callus**. Texture also depends upon the size of the pores. These are largest in the face; in skin of fine texture, the pores are scarcely visible.

The color of the skin. The natural tint of the skin depends upon the pigment produced and carried by the cells of the Malpighian layer of the epidermis. The character of this pigment is mostly determined by an inherited mechanism. Thus we have black, white, yellow, and brown races. Whether a man is black or white depends upon the pigment granules of his racial inheritance. This organic pigment is called melanin (black). The cell which makes it is called a melanoblast (black germ), and the cell which carries it is called a melanophore (black-bearing).

The nature and origin of melanin, and the origin and character of the melanoblasts, have engaged the attention of scien-

tists for years. Their conclusions conflict, and little is definitely known of the actual origin of the coloring matter of the skin. Of the fate of melanin, W. Noel Goldsmith³ says:

Some . . . escapes into the corium, is phagocytosed by the melanophores, and presumably eventually absorbed. The rest is carried up into the superficial layers of the epidermis, where it is converted into some colorless substance, a small proportion persisting and being cast off as such with the horny layer.

On the function of pigment, we quote from the same source: ⁴ "The chief function of pigment is probably to protect the blood from being overheated by the process of conversion of the deeply penetrating red, orange, and yellow rays into heat."

The natural color of the skin is modified by the amount of blood in the superficial capillaries and in the larger and more deeply seated blood vessels, by age, by systemic disturbances (as in jaundice and anemia), by heat and cold, and by the light of ultraviolet rays. When the blood vessels are dilated, the skin is pink; when they are constricted, it is white. Deep color indicates a dilation of the blood vessels and an increase in the amount of coloring matter (hemoglobin) in the red blood cells. A more rapid flow will cause a deeper tint.

The effect of temperature on the skin. Changes in temperature increase or constrict the width of the blood capillaries, thus increasing or lessening their tone. A temperature above normal will cause a suffused redness which may result in a wheal, a blister, or, at a higher temperature, a burn. The skin pales when exposed to cold, and the blood vessels may be so constricted when the temperature drops far below normal as to paralyze their functioning.

Markings and depressions. Ridges and furrows, wrinkles and dimples, mark the skin's surface. Wrinkles are the result of the movements of the superficial muscles of the joints, the contraction of the many small muscles of different parts of the body, a deficiency in glandular secretions, and a shifting

³ Goldsmith, W. Noel, *Recent Advances in Dermatology*. London: J. & A. Churchill, Ltd., 1936, page 40.

⁴ *Ibid.*, page 424.

of fat beneath the skin. A **dimple** is made by the contraction of a muscle; the skin is pulled inward at the point of attachment. **Fingerprints** are copies of minute ridges which form loops and spirals on the ends of the fingers and toes and on the palms of the hands. These ridges are produced by the rows of papillae in the corium. They lift the epidermis and form the pattern, which is never the same in two persons. The ridges also give a better gripping surface to the hands and feet.

Mottling of the skin. To some degree, mottling is a normal condition of the skin. The areas are more or less permanent, and probably depend on the arrangement of some of the skin structures. Red and pale spots and fine speckles are common; large mottlings may appear on the limbs or even on the whole body. The condition is not thought to be caused by nervous influences. Differences between light and dark areas have been found to correspond with variations in the number and diameter of blood vessels owing to differences in their tone resulting from fluctuations in their blood supply.

Skin tension. The skin is always under tension. Its elastic fibers never relax; they are slightly stretched at all times. One of these fibers may be made to stretch half its length. This tension is noticed when a wound occurs; the skin gaps widely as the elastic fibers pull the opening apart. **Flabby skin** is the result of the loss of elasticity of the fibers as well as of the loss of fat in the cells of the subcutaneous tissues.

Allergy and idiosyncrasy. In making tests for allergy and idiosyncrasy, certain substances are placed on a scarified area of the surface of the skin. The problems of why an individual skin will show different reactivity to different substances (**allergia**), and why one individual is more sensitive to a certain substance than another individual (**idiosyncrasy**), involve mainly the factors of heredity, environment, metabolism, and nervous influences.

The Glands

A gland is an organ that secretes any fluid from the blood. Ductless bodies, such as the spleen and the lymphatic organs,

which do not appear to secrete anything, are, however, also called glands.

The structure of the glands. Glands are made up of the same epithelial tissue that covers the body surface; epithelium is the most important secreting agent in the body. Some glands have ducts or tubes for the passage of secretions and excretions such as sweat, sebum, saliva, bile, tears, gastric juices, and so forth. Other glands, the endocrine glands, secrete internally; it is their function to secrete into the blood or lymph substances which affect metabolism. These are called ductless glands.

The functions of the glands of the skin are to produce sebum and perspiration and to eliminate waste substances. Two kinds of glands are situated in the skin. Each one has its special method of forming its secretion: (1) sebaceous (oil) glands, and (2) sudoriferous (sweat) glands.

1. **The sebaceous glands** are holocrine (wholly secretory) organs. Their secretorial cells are cast off and form, after complete disintegration, a part of their secretion. A sebaceous gland consists of a cluster of small secreting pouches or sacs. These sacs vary in number usually from two to five, although 20 have been found in one cluster. There are several hundred thousand oil glands in the body, each one made up of a transparent membrane enclosing a number of epithelial cells, the secretory part of the organ. They originate in the corium and subcutaneous tissues, and usually open into hair follicles, as they are, in principle, derived from the same epithelial rudiment. They usually empty into the follicle, their secretion proceeding upward along the hair shaft. In the absence of a hair in a follicle, this secretion, if obstructed, may form a black-head at the opening of the follicle on the surface of the skin.

The functions of the sebaceous glands are as follows:

- a. To lubricate the skin and the hair shaft.
- b. To remove waste substances from the tissues.
- c. To assist in regulating the body temperature by conserving body heat (by depositing a film of oil on the surface of the skin).

Sebum, the secretion of the sebaceous glands, is a thick, semifluid substance composed of cast-off cells, fat globules, salts, and traces of other substances. The function of sebum is to lubricate the hair and help keep the skin pliable.

Sebaceous glands are found in most parts of the body, being absent in the palms and soles and most numerous in places where there is least fat and most need of protection from heat loss, as in the nose and chin. Their openings often become engorged with an accumulation of sebum, forming **comedones (blackheads)**. In the connective tissue the gland is surrounded by blood vessels, nerves, and lymphatics, and when these are not functioning normally, or when the glands are affected by disease, there will be an excess of secretion (**hypersecretion**) or a diminution of secretion (**hyposecretion**).

2. The sudoriferous glands are merocrine (partly secreting) organs. A sudoriferous gland is a single tube which originates in a coiled mass in the subcutaneous tissue. Because of their coils, they are sometimes called "coil glands." There are two types: (1) the large coil glands, and (2) the small coil glands (the common sweat glands).

a. The large glands originate, as a rule, above the sebaceous glands of the hair follicles. They are found, in man, principally in the axillae, genital regions, and breasts.

b. The small or common sweat glands open directly upon the skin's surface. The coiled mass in the subcutaneous tissue is the secretorial part of the structure. It is surrounded by blood and lymph capillaries, and its cells take water from these vessels and carry it upward by way of a tube which twists into a corkscrew arrangement as it passes through the layers of the epidermis. In some places where the epidermis is very thin, this spiral formation does not exist. The valve-like opening, or pore, becomes somewhat dilated at the surface. These glands number, in the human body, between two and three million, and are found everywhere. They are larger in the armpits, palms, soles, and forehead. The moisture from the large ones of the palms gives a better grasping surface and helps to keep the thickened layer of the epidermis soft and supple. In health, they excrete from a pint to a quart of

perspiration every twenty-four hours. The amount excreted depends upon temperature, clothing, and other factors, and it may be increased by exercise, drugs, massage, and hot packs.

Perspiration is the sweat that appears as moisture on the skin. It is a colorless solution consisting of water, some salts, and a few nitrogenous bodies. It has a characteristic odor and a salty taste. Its reaction is normally alkaline, but when mixed with sebum it becomes acid, a factor which discourages the activities of bacteria on the skin's surface. **Invisible perspiration** goes on constantly, unnoticed, while **visible perspiration** appears as drops of water on the skin.

The principal function of the sudoriferous glands is to pour out moisture to cool the body. As carriers of waste materials, they are of secondary importance. Their excretion is under the control of the **sympathetic nervous system**.

Questions

1. Define the skin.
2. Why is the skin classified as a body organ?
3. Name the appendages of the skin.
4. Of how many main layers is the skin composed?
5. Name the two main layers of the skin.
6. Of what kind of tissue is the epidermis composed?
7. Upon what does the epidermis depend for its nourishment?
8. Is the epidermis supplied with blood and lymph vessels?
9. How does the thickness of the epidermis vary?
10. Describe the growth of the epidermis.
11. Of how many layers is the epidermis composed?
12. Describe the stratum corneum.
13. How is horn-fat produced, and what appears to be its function?
14. Describe the stratum lucidum.
15. Describe the granular layer of the epidermis.
16. Why is the stratum Malpighian called the germinative layer?

17. Which layer of the epidermis contains the pigment cells of the skin?

18. Which layer of the epidermis is able to repair a wound, and by what method is this accomplished?

19. Describe the corium. Of what kind of tissue is it composed?

20. Does the corium contain blood vessels and nerves?

21. What other structures does the corium contain?

22. Of how many layers is the corium composed?

23. Describe the papillary layer of the corium. How does the papillary layer provide the germinative layer with nourishment?

24. Is the papillary layer supplied with nerves? From what nervous system?

25. Give the characteristics of the reticular layer of the corium.

26. How is "goose flesh" produced?

27. Describe the subcutaneous tissue.

28. Is the skin supplied with blood vessels?

29. In what parts of the skin do the largest blood vessels lie?

30. How much blood can the skin store up, on occasion?

31. What are the characteristics of the lymphatics of the skin?

32. How does the lymph plasma nourish skin cells?

33. Which nervous system supplies the corium? How do the nerve filaments end in the epidermis?

34. What sensations do sensory nerves convey? What is the function of the secretory nerves?

35. What is the function of the vasomotor filaments?

36. How is a blush on the cheek produced? What causes the skin to pale?

37. Name the muscles of the skin. Of what kind of muscle tissue are the erector muscles composed?

38. Where are the erector muscles found? Which nervous system controls them? What causes hair to "stand on end"?

39. Name the functions of the skin.

40. Describe the protective function of the skin.

41. In what way does the skin regulate the body temperature?

42. How does the oil on the surface of the skin conserve heat?
43. What is meant by the secretory function of the skin?
44. How is the excretory function of the skin performed?
45. What is meant by the sensory function of the skin?
46. How is the respiratory function of the skin performed?
47. Does the skin absorb liquid substances and fats?
48. How does the skin perform self-renewal and repair?
49. Does the texture of the skin vary in races and individuals?
50. Is the texture of the skin the same on all parts of the body?
51. On what parts of the body is the skin thickest? Thinnest?
52. Why is the skin of young persons different in texture from that of old persons?
53. Can the natural texture of the skin be changed? How may it be influenced?
54. How is a corn or callus produced?
55. Where are the largest pores of the skin found?
56. What determines the color of the skin?
57. Where is the pigment of the skin produced?
58. What factors determine the character of pigment?
59. Has color of the skin been used to classify the human race?
60. What is melanin?
61. What is the cell that makes melanin called? What is the name of the cell that carries it?
62. What becomes of the pigment in the skin as it is replaced by new pigment granules?
63. What is the chief function of pigment?
64. How is the natural color of the skin modified?
65. What condition does deep color indicate? How does a rapid flow of blood affect the tint of the skin?
66. What is the effect of temperature on the skin?
67. What causes wrinkles?
68. What causes a dimple?

69. What is meant by "fingerprints," and how are the minute ridges produced?
70. Is mottling a normal condition of the skin?
71. Discuss skin tension.
72. What is the cause of flabby skin?
73. How are allergy tests made?
74. What is an idiosyncrasy?
75. To what factors are the problems of allergy and idiosyncrasy due?
76. Define a gland.
77. Of what kind of tissue are glands composed?
78. Describe the two different kinds of glands in the body.
79. Name the functions of the glands.
80. Name the two kinds of glands situated in the skin.
81. Why are the sebaceous glands called holocrine glands?
82. Of what does a sebaceous gland consist?
83. How many sebaceous glands are there in the body?
84. Where do the sebaceous glands originate?
85. Where do the oil glands empty?
86. Give the functions of the sebaceous glands.
87. What is the name of the secretion of the oil glands?
88. What is the composition of sebum?
89. Where are the oil glands found? Where are they most numerous?
90. In what parts of the body are sebaceous glands absent?
91. How is a blackhead formed?
92. What is meant by hypersecretion? Hyposecretion?
93. What is meant by a merocrine gland?
94. Of what does a sudoriferous gland consist? Why are such glands called "coil glands"?
95. Give the two types of sudoriferous glands.
96. Where do the large glands originate? In what parts of the body are they found?

97. Describe the common sweat glands.
98. How is the sweat carried to the surface of the skin?
99. Define a pore.
100. How many sweat glands are there in the body?
101. Where are the largest sweat glands found?
102. How much perspiration is excreted by a healthy person every 24 hours? Upon what factors does the amount depend?
103. What is perspiration? What is its composition?
104. What is invisible perspiration? Visible perspiration?
105. What is the function of the sudoriferous glands?
106. Which nervous system controls the excretion of the sweat glands?

Chapter IX

THE HAIR AND THE NAILS

The Hair

A hair is a threadlike outgrowth of the epidermis. It consists of two parts: a shaft and a root. The shaft extends beyond the surface of the skin, tapering to a point at the free end. The root is formed at the bottom of the hair follicle by an expansion of the hair shaft into a bulbous recess or socket which fits over the hair papilla.

The entire surface of the body, with the exception of the palms, soles, and the tips of the toes and fingers, is covered with hair. The dimensions, length, form, texture, and color of hair vary, not only in the different races of mankind, but in the same person at different ages and in different parts of the body. A hair is not of the same dimensions at all parts of its length. On the average scalp area of 120 square inches, the number of hairs has been estimated to be about one thousand to the square inch. The number varies according to color and texture.

The production of hair distinguishes mammals from other vertebrates, while man, in turn, is distinguished from other members of the mammalian class by complete absence of tactile hairs (hairs with sensibility of touch) and in the deficiency of other types, such as wool and fur and spines and awns.

The pilary system in man consists of two general forms of hair: down and terminal hair. The down covers almost the entire body, and consists of soft, colorless hairs with relatively large cuticular scales and generally no medullas. Terminal hairs, so called because they represent the final phase in hair development, are unevenly distributed over the body surface, have relatively smaller scales, and nearly always well-devel-

oped medullas. Between the down and the terminal hair form are found other types in intermediate stages of development. These are called **transitional hairs**.

Hairs of the human body are further **classified** as:

Capilli—of the head.

Cilia—of the eyelashes.

Supercilia—of the eyebrows.

Barba—of the beard.

Vibrissae—of the nostrils.

Tragi—of the ears.

Hirci—of the axillae.

Pubes—of the pubic region.

Lanugo—the down which covers the fetus.

The appendages of the hair are the sebaceous glands and the erector pili muscles (which are also called the arrector pili).

The origin of hair. The hairs of mammals have resemblances sufficient to give rise to the theory that they have developed from earlier and simpler forms in a common line of descent. The other appendages of the skin—scales, feathers, hoofs, horns, and teeth—have, in general, many of the characteristics of hair. Research in this subject has resulted in numerous conclusions, none of which has the unqualified acceptance of all investigators. C. H. Danforth says:¹

We cannot as yet, however, present a clear picture of the phylogeny of hair. Perhaps no such picture is possible, but the subject affords an attractive field for future research. For the present, we must content ourselves with regarding mammalian hair as akin to lateral line organs, tactile organs of reptiles, placoidal scales, teeth, claws, dermal scales, and feathers. It is more closely related to some of these structures than to others, but with none of them is it fully homologous.

The functions of hair. The principal function of hair is protection, but whether the first forms were protective or sensory has not been determined. Hair is well adapted for forming a protective function. Its horny layer sheds water; for heat conservation, not only is it a nonconductor, but the layer

¹ Danforth, C. H., *Hair, with Special Reference to Hypertrichosis*. Chicago: American Medical Association, 1925, page 21.

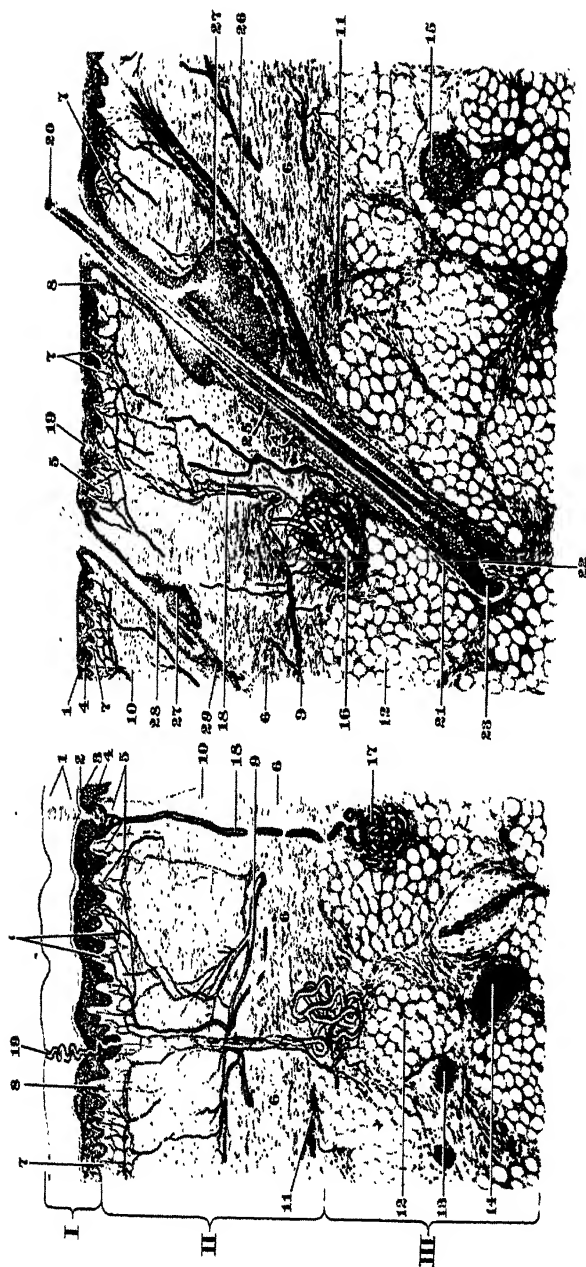


FIG. 16. THE SKIN (HAIRLESS AND Hairy).
Reduction of Frohse Anatomical Wall Charts by permission of A. J. Nystrom & Co., Chicago.

- I. Epidermis (outer skin)
- II. True skin
- III. Subcutaneous tissue
1. Horny layer
2. Granular layer
3. Germinal layer
4. Papillary layer
5. Reticular layer

7. Capillary network (of Wagner, Meissner)
8. Artery
9. Lymphatic vessels
10. Touch corpuscle of Ruffini
11. Lobules of fat
12. Cross section of an artery

14. Cross section of a vein
15. Body of a sweat gland
16. Duct of a sweat gland
17. Pore of a hair
18. Shaft of a hair
19. Hair follicle

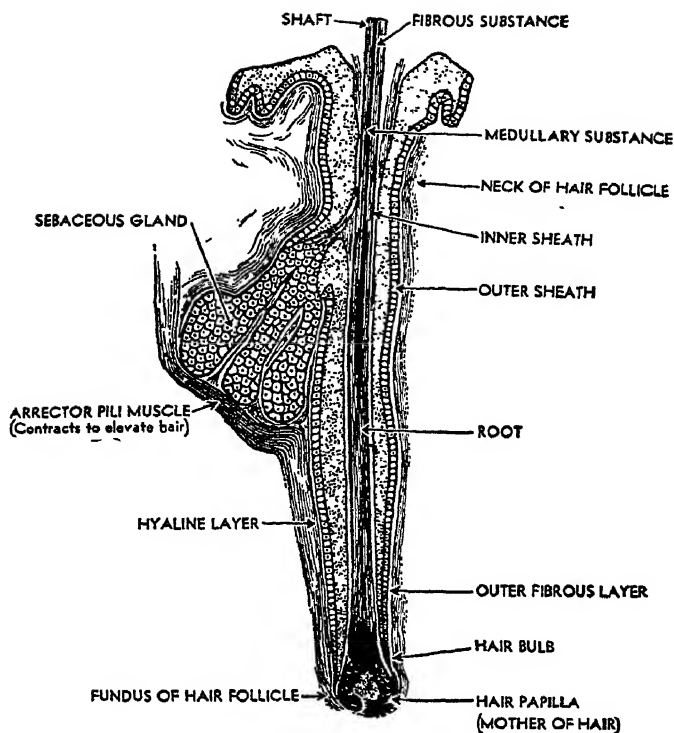
22. Papilla of a hair
23. Bulb of a hair
24. Outer root sheath
25. Inner root sheath
26. Arrector muscle of a hair
27. Sebaceous gland
28. Hair falling out
29. Beginning of a new hair

of air in the fur of an animal prevents heat loss. In very cold weather fur will stand on end in order to produce a more dense air layer, while in man "goose flesh" arises in an effort to serve the same purpose. Hairs of coarseness and rigidity, such as bristles, spines, quills, and awns, are more or less defensive in function. The hairs of the ears and nose catch germs and particles of dust and prevent their entrance into the inner ear and the lungs. Large, stiff hairs, such as whiskers, vibrissae, and tactile hairs that appear in all mammals except man are more or less sensory in function and have been called sense organs.

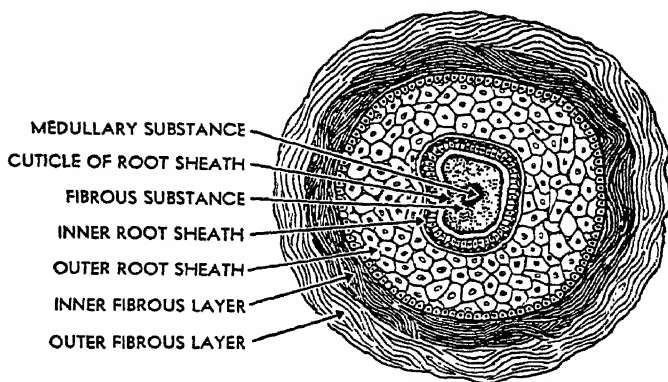
The structure of hair. A hair is produced by a multiplication of specialized cells of epithelial tissue formed in the hair bulb and nourished by the hair papilla. These cells, which may be of flat, elongated, round, or oval formation, are pushed upward into the hair follicle, where they become keratinized (cornified) and arrange themselves into a hair shaft. The shaft is made progressively longer by the addition of cells from below; when it has reached its full length, the cells cease to multiply and a "resting period" begins. Finally, the hair bulb slips from the hair papilla and the shaft drops out or is forced out by the growth of a new hair. The hair shaft is composed of three distinct layers: (1) the cuticle, (2) the cortex, and (3) the medulla.

The cuticle is the outer or visible layer, and is made up of a layer of thin, transparent, unpigmented scales of different forms tightly overlapping in a more or less imbricated arrangement. The free edges of the imbrications point toward the hair tip. This overlapping of horny cells forms an effective protection for the inner layers of cells. A detached hair can easily be pulled between two surfaces, such as thumb and finger nail, if the pull is from root to tip, but not otherwise, because of this arrangement of scales.

The cortex, or cortical substance of the hair, forms the main layer of the hair shaft and gives the hair its flexibility and its color. It is composed of completely cornified cells of an elongated, or cigar-shaped, formation, which make the shaft flexible and strong. Pigment granules are contained in tiny pockets between the cells, and this coloring matter is visible through



A. HAIR FOLLICLE



B. CROSS SECTION OF HAIR

Courtesy of "Modern Beauty Shop Magazine."

FIG. 17. STRUCTURE OF A HAIR.

the transparent wall of the outer layer. In white hair these tiny pockets may contain air.

The **medulla**, the central portion of the hair shaft, is made up of two lengthwise layers of cells. These cells are fewer in number and of looser construction than those of the cortex. The medulla is ordinarily absent from the tip of the hair, and does not always extend to the root. It is usually absent from the down that covers the body and from soft, weak hairs. Even in old age, terminal hairs may be found which lack this central "canal." There seems to be no essential difference in the normal growth of hairs with and without medullas. When a medulla is not present, its usual position may be marked by occasional empty spaces along the shaft, but hairs without medullas usually have a solid cortical core. Pigment granules are often found in the medulla.

The **hair root**. This structure forms, at the bottom of the follicle, a bulbous recess into which the hair papilla fits. The bulb is lighter in color and softer in texture than the shaft, as its cells have not become completely cornified. The bulb may slip from the papilla and come out, in a perfectly normal manner, with a dead hair. The papilla then proceeds to furnish elements for manufacturing new hair cells.

The **hair papilla** is a small cone or eminence extending from the corium and continuous with the dermal layer of the follicle. Its function is to provide nourishment for hair-forming cells, for which purpose it is well supplied with lymph from the blood vessels of the surrounding connective tissues. The papilla is supplied, also, with tiny nerve filaments of the sympathetic nervous system. A healthy hair will fall out when its growth is complete, to be replaced by a new one after a resting period occurs in the follicle; but when a hair falls out because of lack of nourishment to the papilla or injury to the papilla or follicle, it will not be replaced by a new hair.

The **hair follicle** is the sheath in the skin from which the hair grows. It is made up of an outer or dermic covering of connective tissue supplied with blood vessels and nerves, and an inner or epidermic layer which adheres closely to the cuticle of the hair shaft. It is a part of this innermost layer that sometimes adheres to the end of a plucked hair. While the follicle

usually grows in a forward slant, forcing the tip of the hair downward or backward, there are many variations and even reversals in the direction of the hair stream in different species.

The follicle is generally considered responsible for the form of the hair. It has been pointed out by C. H. Danforth² that

. . . opinion has been divided as to whether or not the shape of the follicle could account for the form of the hair. The association of the two conditions seems suggestive, in spite of the fact that the hair is fairly well cornified down nearly to the bulb and the ability of the curved follicle to leave its impress on the shape of the free part of the hair is somewhat doubtful. Perhaps the characteristic bend of the follicle immediately above the papilla is the point where the tendency to curl is really imparted.

There are more follicles in the skin than visible hairs, which accounts for the appearance of hairs, upon the approach of age, on a hitherto hairless region. Inactive follicles may have been stimulated to produce hairs. No outward mechanical processes, such as permanent waving or shaving, can affect the hair follicle.

The appendages of the follicles are one or more sebaceous glands, which pour their secretions against the hair shaft, and below the glands the minute involuntary muscles of the skin, the *erectores pilorum*. Nerves control these muscles, which at times produce a "creepy" sensation of the skin. They are absent from the down follicles of the cheeks, nose, and lips, and also from the nasal hairs and the eyelashes.

Chemical composition of hair. Keratin, an albumin which forms the base of hair, epidermis, and all horny tissues, is composed of carbon, sulphur, nitrogen, hydrogen, and oxygen in percentages which vary with shades of hair color in the same race and in the same person.

Hair form and texture. By hair form is meant its shape and structure as distinguished from the material of which it is composed. The form, color, and texture of hair have been used to classify man into the three general groups³ on page 86.

² Danforth, C. H., *Hair, With Special Reference to Hypertrichosis*. Chicago: American Medical Association, 1925, page 63.

³ Variations are commonly noted in this general grouping of hair forms and in the structure of hair follicles.

1. **Caucasian.** Hair is usually wavy, oval in cross section, and emerges from a slightly curved follicle. Nearly all variations in form, color, and texture may be found.

2. **Mongolian and American Indian.** Hair is coarse, black, and straight, sometimes quite round in cross section but often more or less flattened and emerges from a straight follicle.

3. **Negro.** Hair is short, black, and kinky, flat in cross section, and set in an angular or curved follicle.

Variations in hair form. The classification into straight, wavy, and kinky can be considered only a general grouping of hair forms. In reference to the attempt to classify the races of man on the basis of their hair form, C. H. Danforth says⁴ :

. . . it has been popularly supposed that the Indian's hair is straight because it is circular in cross section, the white man's wavy because it is oval, and the Negro's curly because it is flat. But the case is not quite so simple as this. Negro hair is indeed flattened, but so, too, is much Chinese and Japanese hair that is perfectly straight. Hair that is really oval in section is uncommon.

Students of hair form have become skeptical as to popular suppositions in this subject because of the wide range of variation they have observed on a single head, and even in a single hair. While some hairs may appear circular in cross section through a greater part of their length, they may show a flat outline in the remaining portion of the shaft.

Hair texture varies from very soft and fine hairs to extremely harsh and coarse hairs. The natural texture is not affected by external manipulations, by shaving, or by applications of tonics or hot oil. The bluntness of the hair tips after shaving has been the reason for the supposition that shaving coarsens hair.

Color of hair. Hair color is the result of pigment in the cortex layer, and often the medulla, of the hair shaft. This pigment matter (called **melanin**, meaning *black*) has been found in two forms:

⁴ Danforth, C. H., "The Hair," *Natural History*, Vol. XXVI, 1926, No. 1, page 77.

1. The **melanoproteins**, which are acid-soluble and produce a diffuse stain.

2. The **acid-insoluble melanins**, which appear in the form of separate granules.

A hair may contain both forms of pigment matter, but the granular form is usually present.

Many problems met by the investigators of the production of this pigment have not been solved. The generally accepted theory is that the pigment granules are produced by the hair-forming cells of the hair root.

The variations in color are due to the number of pigment granules. The factors that regulate the amount of pigment and its distribution cause a wide variation in shade in different sections of the same hair shaft, as well as in different persons and in different racial stocks. Few hairs on the same head are of exactly the same shade. Hairs of the body usually contain pigment considerably in excess of that found in the skin from which they develop. In most cases, dark hair accompanies a skin which contains much pigment. If the skin is deficient in pigment, the hair is usually flaxen or blonde. Except in some black-haired strains, the hair of children is usually lighter than that of adults. The factors which regulate the amount and arrangement of the pigment grains are hereditary, and must be taken into consideration. While no two heads of hair will show exactly the same shade, hair color is handed down from one generation to another of the same family.

The dimension of the hair shaft seems to vary according to color, flaxen hair being the finest, and black, or possibly dark red, usually the coarsest. The average number of hairs on the scalp, according to color, has been given as: light, 140,000; dark, 108,000; red, 90,000.

Canities (grayness or whiteness of the hair) is due to the loss of pigment grains in the cortex and medulla. It is the natural tendency of the hair of all races to turn gray by a gradual process as age advances. Some of the follicles fail to produce pigmented hairs, the change apparently taking place at the time the hair-forming cells of the papilla produce a

new hair, since a hair is usually entirely pigmented or entirely gray. The sudden graying of hair has not been proved. What actually happens in the follicle before the hair loses its pigment, or the hair cells lose their power to produce it, is not known. Whiteness of the hair may accompany, at times, leukoderma, a pigmentary disturbance of the skin, or it may follow a constitutional disease, after which the original color may be restored.

Albinism is the condition in which pigment is wholly absent from the hair. Usually the skin likewise is without visible pigmentation. It may be due to the inherited inhibition of the factors that produce the coloring matter in the hair-forming cells.

Factors Affecting Hair Growth

The growth of the hair depends upon the factors that control the activity of the papilla, the multiplication of cells in the hair root, and the health of the hair follicle. The exact nature of the processes which take place is not fully known, but the general character of these processes has been more or less determined.

Heredity plays an important role. The hair-determining factors in the chromosomes of the life cell have decided the form, texture, color, and life cycle of each hair.

Vascular and nervous factors. Small arteries of the systemic circulation form a network in the connective tissue and supply nourishment for growth. As this supply is influenced by the nerve filaments that extend to the follicle and papilla, the growth of hair may be stimulated or retarded by disturbances in the circulatory system and the sympathetic nervous system.

The effect of temperature on hair growth. It has often been assumed that a warm climate will cause a reduction in the amount of hair, and that cold stimulates hair production. Scientific data in support of these views is far from convincing. Animals that are not protected by a warm covering against cold can live only in a warm climate, however, and that there is a direct physiologic adaptation to climate is

possibly indicated by seasonal differences in the pelts of some animals.

Endocrine factors. There seems little doubt that some of the hormones poured into the blood by the glands of internal secretion are brought to the papilla and thus stimulate or retard the production of hair cells, or affect them indirectly by affecting their sources of nutrition. The appearance of the terminal hairs at puberty, the slight excess of hair growth during pregnancy, and the scant coarse hair noted in cretinoid conditions point to the influence of the gonads (sex glands), the thyroid, the pituitary, and the suprarenals.

Cutting and shaving do not stimulate hair growth. Also, there is no evidence that these practices stimulate inactive follicles in the same region to produce hair.

✓**The cycle of hair growth** is the time between the first appearance of a hair and its replacement by a new one in the same follicle. This life span is more or less in proportion to the size of the hair, a coarse hair surviving for a longer period than a fine, weak hair. In a healthy hair in the scalp, the average rate of growth is from $\frac{3}{8}$ to $\frac{3}{4}$ inch per month; the average length of life, from four to seven years. The length of life of an eyelash is about five months. After the age of 60, irregularities in the life cycle of a hair may be noted; hair growth slows down at the approach of age. That the hair grows faster in summer than in winter, and by day than by night, has not been proved.

A resting period occurs when the papilla is inactive. There is no conclusive evidence as to the periods of time that elapse between the cessation of growth, the complete cornification of the hair bulb, and the awakening of the papilla to the production of a new hair.

Hypertrichosis is the term applied to hair growth on any part of the body in excess of the amount usually present in persons of the same race, sex, and age. Some cases are associated with abnormal pathological conditions; some are not. Most persons develop terminal hairs on the legs, and a slight excess growth on the face is common in women when some of the down hairs, usually on the upper lip, grow longer and

become pigmented. It has been conceded that this form of hypertrichosis represents a normal hereditary condition. Usually there is no increase after the first excess growth has appeared. As to whether the apparent difference in the amount of terminal hair on the female body is related to hair color, Danforth and Trotter found that⁵: ". . . the evidence, as far as it goes, indicates that individuals with dark hair on the head are, on the whole, inclined to have more terminal hair on the body than do lighter-haired subjects."

The causes of hypertrichosis have been given as hereditary and endocrine. Certain races show a tendency toward it; the trait has been handed down in families, usually from mother to daughter. As so many cases are associated with deviations from the normal functioning of the glands of internal secretion, producing full-bearded women and "dog men," gland activities have been generally accepted as a factor contributing to abnormal hair growth.

Age changes in hair growth. Changes take place gradually, from the appearance of hair in the fetus, through childhood and maturity, to old age. Intermediate forms, from the finest down to bristles, may be found on the body of any normal person. The amount of terminal hair increases progressively until late in life, owing to some unknown factor which provides stimulation to hitherto inactive follicles. The tendency of down follicles to produce down hairs for years, and then, after a few transitional forms, to develop terminal hairs, is one of the curious phenomena noted in all body structures. The length and diameter of hair and the amount of pigment increase in adult life, as, for example, in the hairs of the beard, eyebrows, nose, and ears of men. Only part of the hairs of any region seem to be affected by these age changes; many hairs continue as soft down throughout the life of the individual. For convenience in terminology, these age changes have been grouped into three classes:

1. **Primary hair**—the lanugo of fetal life, characterized by small size, lack of pigment, and absence of medulla.

⁵ Danforth, C. H., and Trotter, Mildred, "The Distribution of Body Hair in White Subjects," *American Journal of Physical Anthropology*, Vol. V, No. 3, 1922, page 263.

2. **Secondary hair**—the soft hair of childhood, lasting until about puberty.

3. **Terminal hair**—coarser, longer, more heavily pigmented, with well-developed medulla.

The Arrangement and Direction of Hair

Hair has a natural tendency to appear singly, in groups, and in rows, on different parts of the body, and to point in a certain slant. This slant is determined by the direction of the follicle from which the hair emerges, but the factors that determine this direction of the follicle have not been agreed upon. The position of the follicle may be controlled by the tension of the elastic tissue fibers in the corium, by the pull of internal muscular fibers, by external pressure, or even by friction. As all the follicles on a given surface usually point in the same direction, it seems reasonable to suppose that the function of hair is that of protection, and that the thickness of the hair and the follicle-slant on the back of an animal are for the purpose of throwing off the rain.

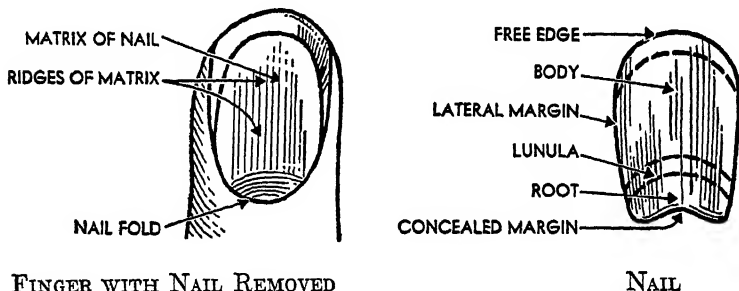
The hair slope. More or less individual variation is found in the direction of hair, although all the hairs over a given surface usually point in the same direction. Such an area is called a hair slope or stream. At their common boundary, two adjacent hair slopes may converge or diverge, the former condition producing a crest, the latter a natural parting, which on the head is usually on the left side, less often on the right, and sometimes in the middle. A whorled arrangement of hairs at the end of a hair slope is called a **cowlick**.

Ringlets occur where the direction of the follicles is irregular and where they point toward small centers in the skin. Whether each of the tightly clinging masses of hair represents a natural grouping of follicles for some special reason has aroused much speculation.

The Nails

A nail is the horny scale or plate of the upper surface of the ends of the fingers and toes. It is made up of clear, flattened scales developed from the stratum lucidum layer of the epidermis, and for this reason it is called an appendage of

the skin. Nails differ from all other horny tissues, such as hoofs, claws, and feathers, only in shape and thickness. The outer surface of the nail plate is convex; the inner surface, concave. This curvature is an important factor in holding the nail to the nail bed. Under the nail, the rows of papillae are greatly enlarged, and they adhere to the ridges on the



Courtesy of "Modern Beauty Shop Magazine."

FIG 18. STRUCTURE OF THE NAIL.

inner surface of the nail, enabling it to perform its function of defense and to grasp and hold objects without being torn away.

Divisions of the nail are as follows:

1. The matrix.
2. The nail body.
3. The free edge.

The **matrix** (nail root or nail bed) is the part beneath the nail at its base. The function of the matrix is to develop nail-making cells. The deep fold of skin in which the matrix lies is called the **mantle**. The pocket formed in the mantle is called the **nail groove**.

The **nail body** is the exposed part of the nail. It is the nail plate resting on the nail bed, or matrix.

The **free edge** extends beyond the fingertips. It is the unattached part of the nail and may be filed or cut.

The layer of skin beneath the free edge is called the **hyponychium**. The narrow band of cuticle overlapping the nail body is called the **eponychium**.

The crescent-shaped marking at the base of the nail is called the lunula. At this point the nail plate is thicker and thus less transparent, making the lunula appear whiter than the upper part of the nail. Absence of lunula is a rare condition of the nail.

The growth of the nail is accomplished by a multiplication of cells in the germinative layer of the epidermis (stratum Malpighian), which is called at this point the matrix, or nail bed. The cells are transformed into harder dead cells than those which compose the horny layers in other parts of the body. As the nail grows, these cells are pushed over the nail bed toward the tip of the finger, forming a solid plate. A fingernail grows in from four to six months. Toenails, being thicker, require more time for growth. A nail may be damaged or torn from its root and still will grow again if the nail-making cells are not injured. Transverse grooves on nails are caused by uneven growth.

Chemical composition of the nail. Keratin is the primary constituent. Keratin is made up of about 50 per cent carbon, with oxygen, hydrogen, nitrogen, and sulphur in percentages which vary in races and individuals, in adults and children, and in different states of body health.

Blood and nerve supply of the nail. The matrix is well supplied with nerve filaments and with blood and lymph capillaries from the surrounding tissues.

Questions

1. Describe the parts of a hair.
2. Define hair shaft.
3. How is the hair root formed?
4. Upon what parts of the body does hair grow?
5. Is a hair of the same dimension throughout its length?
6. How does the production of hair distinguish man from other mammals?
7. What are tactile hairs?
8. Of what does the pilary system in man consist?
9. Describe down. Upon what parts of the body is it found?

10. Describe terminal hair.
11. What are transitional hairs?
12. How are hairs of the body further classified?
13. What are the appendages of a hair?
14. Discuss the origin of hair, and its relation to other appendages of the skin.
15. What are the functions of hair?
16. How is hair adapted to perform a protective function?
17. What type of hair is defensive in function?
18. How is hair produced? How is hair nourished?
19. Name the different forms of hair cells.
20. What is meant by a "resting period" in hair growth?
21. Of what three distinct layers is the hair shaft composed?
22. Describe the structure of the cuticle layer. What is the function of the cuticle?
23. Describe the cortex. How does the shape of the cells of the cortex make the hair flexible and strong?
24. In what parts of the cortex are pigment granules found?
25. What is the central portion of the hair shaft called? Describe the formation of its cells.
26. Is a medulla present in all hairs?
27. Describe the hair root. Where does it lie?
28. Define hair papilla.
29. What is the function of the papilla?
30. How is the papilla supplied with nourishment in order that it may make hair?
31. From which nervous system does the papilla receive nervous impulses?
32. Under what conditions may a healthy hair fall out?
33. Describe the hair follicle. Of how many layers of connective tissue is it composed?
34. Is the shape of the follicle responsible for the form of the hair which emerges from it?
35. Does every follicle in the skin contain a hair?

36. Do permanent waving and shaving affect the hair follicle?
37. What are the appendages of the hair follicle?
38. How do the sebaceous glands lubricate the hair shaft?
39. What produces creepy sensations of the skin?
40. Are erector muscles found in connection with all the hair follicles of the body?
41. What is the chemical composition of hair?
42. Of what elements is keratin composed? How do the percentages of these elements vary?
43. Define hair form.
44. How has hair form been used to classify man into racial groups?
45. Discuss variations in hair form.
46. How does hair texture vary?
47. Can hair texture be affected by external manipulations of the scalp?
48. Can the natural texture of hair be changed by applications of hot oil or tonics? Does shaving coarsen hair?
49. How is color in hair produced?
50. What is melanin? Name two forms of melanin. Which form is usually present in hair?
51. What layers of the hair shaft contain pigment granules?
52. To what factor are variations in hair color due?
53. Are all hairs on the same head of exactly the same shade?
54. How do the dimensions of the hair shaft vary according to color?
55. What is the term used for grayness or whiteness of hair?
56. Has the cause of loss of pigment in the hair been explained?
57. What is albinism? To what factor may it be due?
58. Upon what does the growth of hair depend?
59. How may heredity be a factor in hair growth?
60. Discuss vascular and nervous factors affecting hair growth.
61. How do heat and cold affect hair growth?

62. How may the secretions of the endocrine glands affect hair growth?
63. Do cutting and shaving stimulate hair growth?
64. What is meant by the cycle of hair growth?
65. What is the average rate of growth of a healthy hair in the scalp?
66. What is the average life span of a healthy hair?
67. What is the life span of an eyelash?
68. What is hypertrichosis?
69. Does an excess growth of hair on the face always represent an abnormal condition?
70. What are the causes of hypertrichosis?
71. Discuss age changes in hair growth.
72. What is meant by primary hair?
73. What is the soft hair of childhood called?
74. What is meant by terminal hair?
75. Discuss the arrangement and direction of hair.
76. How is the position of the follicle in the skin thought to be controlled?
77. How is the slant of the hair determined?
78. Define hair slope.
79. How is a parting of the hair on the scalp created?
80. How is a crest formed?
81. How is a cowlick formed?
82. Under what conditions, and where, do ringlets occur?
83. Describe a nail.
84. How do nails differ from other horny tissues?
85. How does the shape of the outer surface of the nail differ from the inner surface?
86. What is the principal function of the nails?
87. Into what parts is the nail divided?
88. Describe the matrix of the nail and give its function.
89. What is the name of the fold of skin in which the matrix lies?

90. What is the nail body?
91. What part of the nail is called the free edge?
92. Define hyponychium. Define eponychium.
93. Describe the lunula.
94. Explain why the lunula appears whiter than the upper part of the nail.
95. How is the growth of the nail accomplished?
96. How often do fingernails replace themselves?
97. Will a nail be replaced if torn from its root?
98. What is the cause of transverse grooves in nails?
99. What is the chemical composition of the nails? How do these chemical elements vary?
100. Where is the blood and nerve supply of a nail located?

Chapter X

DISEASES AND ABNORMAL CONDITIONS OF THE SKIN, HAIR, AND NAILS

The skin is as subject to disease as any other body organ. Some diseases are peculiar to the skin itself, for example, psoriasis and seborrheic dermatitis, and apparently do not affect any internal organ besides. Others, such as smallpox and measles, are expressions of diseases of the entire body. Hives and urticaria are expressions of a hypersensitiveness of the blood, and shingles is the result of nervous irritation. Boils accompany diabetes; bacterial invasions cause the infection in erysipelas and acne. Other conditions are due to the invasion of the skin by animal parasites, such as the itch-mite. A disease of the skin is known as a **dermatosis**.

Dermatology has been called one of the most confusing branches of medicine. Throughout the world, in research laboratories, deductions being made from immunological experiments so conflict as to make necessary a reconsideration of the theories based upon previous experiments. For obvious reasons, most of the diseases of the skin *should not be treated in a beauty shop*.

An **inflammation** is the reaction of the tissues to irritation, producing swelling and pain. An inflammation of the skin may be caused by bacterial invasion, intense heat, strong light, and chemical irritants.

Dermatitis venenata is an inflammation due to the local action of an external poison. The following substances are among those to which attention has been drawn as occasional causes: dyes, salts, powders, ragweed, poison oak, poison ivy,

celery, cinnamon, and quinine. Industrial, or occupational, dermatitis may occur among rubber or leather workers, printers, bakers, woodworkers, and others.

Eczema is an inflammation in which the epidermis is conspicuously involved. In the early stage it causes pimples and red areas, a watery discharge, scales and crusts develop, and there is an itching of the skin.

Psoriasis is a skin disease of many varieties, characterized by the formation of red patches on the extensor surfaces of the body. In the form **psoriasis punctata**, the lesions consist of red pinhead-shaped papules, often surmounted with pearly scales.

Impetigo is an inflammatory skin disease characterized by isolated pustules. Some forms are caused by staphylococci, and are marked by flat vesicles that become pustular and then crusted, as in *impetigo contagiosa*.

Erysipelas is an acute inflammatory skin disease marked by chill, fever, and redness of the skin and mucous membrane.

Furunculosis is a diseased condition that accompanies the appearance of boils. A **boil**, or **furuncle**, is a painful nodule formed by a circumscribed inflammation of the corium and subcutaneous tissue, enclosing a central core.

A **carbuncle**, also called **anthrax**, is an inflammation of the subcutaneous tissue terminating in a slough (a mass of dead tissue) and suppuration, accompanied by marked constitutional symptoms.

Herpes simplex (fever blister), is marked by the formation of one or more vesicles on the border of the lip or other mucous surface of the body.

Urticaria, **nettle rash**, or **hives**, is characterized by the sudden appearance of smooth, slightly elevated patches, attended by severe itching. Shellfish, strawberries, and other foods may produce this condition.

Verruca, or **wart**, is an elevation of the skin. The common type, formed by hypertrophy of the papillae, is known to all. Less common varieties are the soft warts that occur on the scalp, neck, and face, the moist or "fig" wart, and the groups of tiny flattened papillomata with a shiny surface.

Senile flat warts are probably more of the nature of nevi, or moles.

Mole, or **nevus**, is a fleshy mass or tumor; a brownish spot on the skin, either congenital or acquired.

A **lesion** is a tissue change in any hurt, wound, or local degeneration. The more important **primary** lesions of the skin are described as follows:

1. A **papule**, or pimple, is a small, circumscribed elevation.
2. A **pustule** is a small elevation of the cuticle filled with pus or lymph.
3. A **vesicle** is a small sac, or blister, containing liquid.
4. A **bleb** is any skin vesicle filled with liquid, as a blister.
5. A **macule** is a discoloration, not elevated above the surface.
6. A **wheal** is a white or pinkish elevation or ridge, as in urticaria. It may be formed from the stroke of a whip.
7. An **epithelial tumor** is a swelling; an abnormal multiplication of cells which form a mass of new tissue.
8. **Keloid** is a new growth or tumor of the skin consisting of nodules, ridges, and plates of thickened tissue.
9. A **tubercule** is a nodule or small elevation.

The important **secondary** lesions of the skin are described below:

1. A **fissure** is a cleft or groove. Abnormal fissures occur in chapped hands and lips.
2. An **ulcer** is an open sore, other than a wound.
3. A **scale** is any platelike structure such as compacted cells shed from the surface of the skin.
4. A **crust** is any outer layer, especially one formed by the drying of body excretion.
5. An **excoriation** is any superficial loss of skin substance such as that produced by scratching or friction.
6. A **scar** is the mark left by the healing of a wound or sore. Common diseases that leave scars are smallpox, syphilis, and tuberculosis.

Pigment Abnormalities

Pigmentation of the skin may be increased (hyperpigmentation) by different causes, local and general. The response to both causes varies according to the predisposition of the individual.

Melanoderma, or black skin, is an abnormal deposit of melanin in the skin.

Lentigo, a freckle, is a small local pigmentation, irregular in outline and sharply marked from the surrounding skin. Though more numerous in warm weather, large ones may persist throughout the year. Freckles appear early in life, and a predisposition to them is an inherited characteristic. Moles (nevi) of the flat, pigmented type cannot be sharply differentiated from freckles.

Sunburn is a dermatitis, with burning and redness, caused by exposure to the sun and air, which stimulate pigment growth. **Tan**, also called suntan, is the brownish color that persists after sunburn has been relieved.

Chloasma is the name given to patches of brownish and yellowish color larger than freckles. Their area is increased by light, but is not dependent upon it. Chloasma is also known as moth patch and liver spot.

Pigment-free areas, or depigmentation, may be congenital or acquired, or may follow various inflammatory processes and eruptions. There is either absence of pigment or an inability, temporary or otherwise, to form it. The complete disappearance of pigment already formed remains unexplained.

Albinism is an abnormal whiteness of the skin, hair, and eyes, partial or total. It is apparently due to the inhibition of certain heritable factors, an inability to develop color. In this case, exposure to light has no effect in stimulating pigment growth.

Leukoderma, or leukodermia (white skin), is a pigmentary disturbance, a congenital lack of normal pigmentation of the skin. The patches are of roundish shape, with normal or hyperpigmented surrounding skin. If the condition is acquired, it is called vitiligo. In syphilitic leukoderma, small,

round, pale areas, often seen only on the neck, are without sharp outline, and resemble the patches of psoriasis, eczema, pityriasis, and so forth.

Vitiligo is a condition in which there appear small round or oval white spots which may come to a standstill at any stage, remain stationary, and progress again. In this respect they differ from leukoderma, in which the white areas are fixed.

Abnormal Conditions of the Sebaceous Glands

Seborrhea is a chronic disease of the sebaceous glands, marked by an excessive discharge of sebum and the forming of white or yellowish scales on the body. It is generally attended by itching and burning. It is found in two forms:

1. **Seborrhea oleosa**, in which the discharge is oily.
2. **Seborrhea sicca**, characterized by the formation of dry scales or scabs. It is still not definitely determined whether dandruff or pityriasis capitis is a form of seborrhea in which the sebum dries to form scales, or whether it is due to an infection. In some cases, the scales are the natural result of the exfoliation of the epidermis of a healthy scalp, as in common dandruff, while pityriasis is characterized by dry, lusterless hair and itching scalp.

Acne is any inflammatory disease of the oil glands of the skin.

1. **Acne vulgaris**, or common acne, occurs most frequently on the face, back, and chest. The inflamed glands form pink papules with a comedone in the center, or inflamed pimples with pus and hardened nodules.

2. In **acne punctata** the lesions are pointed pimples in the center of which are blackheads.

3. **Acne indurata** is acne vulgaris marked by a livid hardening of the tissues.

4. **Acne rosacea** is a chronic inflammation of the skin, especially of the nose.

Asteatosis is a deficiency or absence of sebaceous secretion (hyposecretion), which may be an indication of a systemic

disturbance, the result of senile changes in the gland cells, or an effect of the alkalies in soaps.

Comedo (blackhead) is a plug of dried sebum in the opening of a sebaceous duct.

Milium (whitehead) is a small, whitish nodule in the skin. Milia are usually retention cysts of sebaceous glands and hair follicles.

Steatoma (wen) is a sebaceous cyst.

Abnormal Conditions of the Sudoriferous Glands

Sudamina are whitish sacs caused by the retention of sweat in the ducts of the glands or in the layers of the epidermis. The eruption sometimes occurs after profuse sweating (hypersecretion).

Miliaria (prickly heat) is an acute inflammation of the sweat glands characterized by the formation of red pimples and sacs.

Bromidrosis, or **osmidrosis**, is the secretion of fetid perspiration.

Anhidrosis is an absence or deficiency of sweat.

Uridrosis is a condition in which constituents of urine are excreted in the sweat.

Diseases of the Scalp and Hair; Abnormal Forms of Hair Growth

Alopecia (baldness)—deficiency of hair. The relative absence of hair on all or part of the body may be either transient or permanent, congenital or acquired. The hair follicle may be destroyed, or so diseased that its function is inhibited. Several constitutional diseases are sometimes followed by baldness. In these cases, the hair grows again. The parasites of ringworm and *favus* are among the causes of alopecia areata, and *seborrhœa* is sometimes regarded as a predisposing condition. Some of the forms of alopecia are classified as:

Alopecia adnata—congenital baldness.

Alopecia praematura—premature baldness.

Alopecia senilis—baldness of age.

Alopecia symptomatica—occurring in the course of some disease, or after long fevers.

Alopecia areata—patches of baldness which leave the scalp smooth and white.

Pityriasis, when occurring on the scalp, resembles common dandruff, but is an infectious disease. When the oily condition is present, the scales mat and clog the openings of the hair follicles. The dry condition is accompanied by dry, lusterless hair, itching scalp, and gray scales.

Tinea, or ringworm. Ringworm fungi attack the hair within the follicle, and also within the shaft.

Tinea sycosis, or *tinea barbae* (barber's itch), is a disease of the bearded parts of the face and neck. It is caused by one or another of the trichophyton fungi, and is marked by reddish patches covered with dry, brittle hairs and yellow scales, or pimples with pus.

Trichophytosis is due to the presence of trichophyton fungus.

Favus (honeycomb ringworm) is caused by a parasite fungus and marked by the formation of crusts resembling honeycomb, which are usually situated over hair follicles. The crusts are attended with intense itching, and have a disagreeable odor. Favus may affect any part of the body; when occurring on the scalp, it results in loss of hair. Scars from favus are white or pink and shiny.

Folliculitis is an inflammation of the follicle or follicles.

Lepothrix (scaly hair) is a condition of parasitic origin, in which masses of the trichosporon organisms occur in the hair shaft, breaking up the substance of the cortex. The hair breaks off close to the scalp.

Trichorrhesis nodosa is a dry, brittle state of the hair marked by alternate constrictions and swellings along the hair shaft. The cortex has been fractured and split into many short strands, and the hair breaks between the nodes.

Ringed hair is of rather rare occurrence. Banded zones of light and dark color appear along the hair shaft. As with other abnormal manifestations of hair growth, the cause has not been determined.

Monilethrix. The hairs show alternate nodes, and more slender internodes. These changes in the hair shaft occur at more or less regular intervals. It has been found to be, with few exceptions, congenital and hereditary. Because of the delicacy of the internodes, the hair tends to break just beyond the opening of the follicle on the scalp, and causes, sometimes, an alopecia.

Canities is grayness or whiteness of the hair. Pigment is partially or wholly absent in the hair shaft. The three types are: **congenital**, as in albinism, **premature**, which may occur at any time, and **senile**, the grayness or whiteness of old age. The cause of the absence of pigment in the hair is not known.

Hypertrichosis (superfluous hair) is discussed under "Factors Affecting Hair Growth" in Chapter IX.

Pediculosis capitis is the pathological condition resulting from the presence of lice on the head.

Nail Diseases and Abnormalities

An **onychosis** is a disease or deformity of the nail or nails.

Onychatrophia is atrophy of the nail.

Onychauxis is overgrowth of the nail.

Onychia is characterized by inflammation of the matrix, and results in loss of the nail.

Onycholysis is a loosening of the nail.

Onychomycosis is a disease due to the presence of the ring-worm or favus fungus. The nails become opaque and thickened, weak and brittle.

Onychophagy is the habit of biting or gnawing the nails.

Onychoptosis is shedding of the nails.

Onychorrhaxis is splitting of the nail.

Paronychia (felon) is an abscess with suppuration of the terminal phalanx (phalange) of the finger. It may be superficial and confined to the structure about the nails, or deep-seated, in which case the periosteum and bone are affected, and there are pain and marked constitutional disturbance.

Questions

1. Define dermatosis.
2. Should all diseases of the skin, hair, and nails be treated in a beauty shop?
3. Define inflammation. What factors often lead to external inflammations of the skin?
4. What is dermatitis venenata? What substances are commonly active in precipitating this condition?
5. What is an industrial dermatitis?
6. What is eczema?
7. What is psoriasis? Psoriasis punctata?
8. Why should impetigo not be treated in a beauty shop? What form of bacteria make impetigo a contagious disease?
9. What are the symptoms of erysipelas?
10. What is furunculosis? How is a boil formed?
11. What is the term for carbuncle? What are the characteristics of a carbuncle?
12. Describe herpes simplex.
13. Describe the symptoms of urticaria and name some foods which may cause it.
14. Define a wart.
15. Name some varieties of warts.
16. What is a mole?
17. What is a lesion? Give the important primary lesions of the skin.
18. What is a pustule? A vesicle?
19. Define bleb. Define macule.
20. What is a wheal? How is an epithelial tumor formed?
21. Give the important secondary lesions of the skin.
22. Define keloid; tubercule; fissure.
23. Define ulcer; scale; crust.
24. What is an excoriation?
25. How is a scar formed? Name some diseases that leave scars.

26. How may pigmentation of the skin be increased?
27. What is meant by hyperpigmentation?
28. What is melanoderma?
29. What is lentigo?
30. What causes sunburn? What is tan?
31. Define chloasma. By what other names is it known?
32. What is meant by depigmentation? Can the complete disappearance of pigment in the skin be explained?
33. What is albinism?
34. Briefly describe leukoderma and syphilitic leukoderma.
35. How does vitiligo differ from leukoderma?
36. Name several abnormal conditions of the sebaceous glands.
37. Describe seborrhea. What are the two forms of seborrhea?
38. What is the character of the discharge in seborrhea oleosa?
39. Describe seborrhea sicca.
40. What causes the shedding of scales in seborrhea sicca?
41. What is the difference between common dandruff and seborrhea sicca?
42. Define acne.
43. Name the different forms of acne.
44. What is acne vulgaris? Where does it most frequently occur?
45. How can acne punctata be recognized?
46. Describe acne indurata.
47. What is acne rosacea? Where does it most frequently occur?
48. Define asteatosis.
49. What is meant by hyposecretion?
50. What is comedo? By what other name is it known?
51. Define milium.
52. Define steatoma.
53. Name some abnormal conditions of the sudoriferous glands.
54. What are sudamina?
55. What is hypersecretion?

56. What is miliaria? By what other name is it known?
57. Define bromidrosis, anhidrosis, and uridrosis.
58. Describe alopecia. By what common name is it known?
59. Is absence of hair on the body due to any one cause?
60. What are some of the forms of alopecia?
61. What is alopecia adnata? Alopecia praematura?
62. What is the baldness of age called?
63. What is alopecia symptomatica?
64. Describe alopecia areata.
65. Name some common disorders of the scalp and hair.
66. Is pityriasis the same as common dandruff?
67. Should pityriasis be treated in a beauty shop?
68. Describe the oily and dry forms of pityriasis.
69. What is tinea? What other term is used for this disease?
70. What is the common name for tinea sycosis? Where does it occur on the body?
71. What fungus causes tinea sycosis?
72. To what fungus is trichophytosis due?
73. Describe favus. How is it caused?
74. What is folliculitis?
75. What is leprothrix? How does it affect the hair shaft?
76. Describe trichorrhhexis nodosa.
77. What is meant by ringed hair?
78. Describe the condition called monilethrix.
79. Define canities. What are the different types of canities?
80. What is the cause of the absence of pigment in the hair?
81. What is the common term for hypertrichosis?
82. What is pediculosis capitis?
83. What is an onychosis?
84. What is atrophy of the nail called?
85. What is an overgrowth of the nail called?

86. Describe onychia. How may it affect the nail?
87. What terms are used, respectively, for the loosening, shedding, and splitting of the nail?
88. What is onychomycosis?
89. What is the term used for nail biting?
90. What is paronychia? Describe this condition.
91. Name two common diseases of the nails.

Chapter XI

STERILIZATION AND SANITATION

Every instrument, utensil, and article used in a beauty shop may be considered a possible source of infection unless it has been sterilized and kept sterile until it is used. After sterilization, an instrument or article may quickly become nonsterile again unless it is kept in a cabinet sterilizer or an air-tight or dust-proof container. Consequently it is highly important that sterilization and sanitation be practiced in beauty shops to prevent the transmitting of disease.

It is possible to transmit disease through common use of towels, hairpins, combs, brushes, and so forth; through the use of nonsterile manicuring and haircutting instruments and other tools; by the hands; and through direct or indirect contact with a person who has a contagious disease.

An operator is not permitted to work over abrasions, inflammations, or pus conditions of the skin, or over an open wound of any character, because of the danger of transmitting disease-producing microorganisms; but whether or not the presence of harmful bacteria is suspected, the sterilization of linens, instruments, articles, and the hands must be effected in order to prevent the transmission of bacteria from one person to another in the shop.

By "sterile" linens, instruments, and hands is meant those which have been submitted to a sterilizing process so that any bacteria thereon are destroyed and, therefore, cannot be transmitted to another person.

In the practice of cosmetology, after linens and instruments have been sterilized, they must be kept free from dust and contact with nonsterile objects. In this condition they are referred to as "sterile."

State Board of Cosmetology and State Board of Health requirements for sterilization and sanitation in beauty shops and beauty schools in various states differ but slightly in the following essentials:

1. The use of a cosmetological establishment or school for sleeping or living purposes is prohibited according to law.

2. Every school or shop shall be provided with at least one covered container for soiled linens, one covered container for waste, one dust-proof container for sterile linens, cotton gauze, chair cloths, and so forth, and one air-tight container for sterile instruments. An air-tight container which contains a disinfectant (such as a solution of formaldehyde), the fumes and vapors of which circulate in the container as an additional and secondary sanitary precaution to keep the sterile articles germ-free, is referred to as a "cabinet sterilizer." Cabinet sterilizers may be of different sizes and structure, but all articles placed in a cabinet sterilizer must first be properly sterilized. A cabinet sterilizer may also be referred to as a "vapor sterilizer."

3. Floors shall be covered with a non-absorbent material. All woodwork and furniture shall be of such construction that it can be kept clean at all times.

4. Suitable plumbing and fixtures shall be provided to afford hot and cold running water in the booths and work-rooms.

5. Phenol (carbolic acid) shall not be applied locally in a solution or mixture of more than 5 per cent, or corrosive sublimate (mercury) or its preparations or derivatives or compounds in a stronger solution than one to five hundred.

6. No person shall work in a beauty shop or school who is suffering from a communicable disease.

7. Lump alum or styptic pencil shall not be applied to arrest bleeding. Liquid or powder astringents may be applied with sterile gauze or cotton.

8. Open cuts or bruises shall not be dusted with powder during make-up.

9. A headrest must be covered with a sterile linen or a sanitary paper towel for each patron.

10. Used towels must be laundered and boiled for 20 minutes and placed in a dust-proof or air-tight container. A sanitary neck strip or a sterile towel must be used to prevent any covering from coming into direct contact with a patron's skin.

11. Instruments which come into direct contact with a patron must be sterilized by a bacteriologically effective method.

12. Glass or metal articles must be sterilized; combs and brushes and other articles shall not be employed after once used until they have been cleansed and rendered sterile.

13. Shampoo trays and bowls must be washed after each shampoo and frequently cleansed with disinfectant.

14. No cosmetologist shall massage any patron whose skin is not free from abrasions, inflammations, or pus conditions, unless under the supervision of a physician.

15. Every operator must wash her hands with soap and running water before and after serving each patron. As an additional and secondary sanitary measure, an operator must sterilize her hands with a sterilizing solution, such as alcohol, before giving a facial or a manicure, before removing hair by a temporary or permanent method, or at any time when this precaution may be advisable or necessary. She shall wear at all times a clean, washable, outer garment when serving a patron and when occupied with other duties in the shop.

16. Lotions or fluids must be poured into a sterile container and applied by means of sterile cotton or sterile applicators.

17. Creams, lotions, and other cosmetics used for patrons must be kept in closed containers. Powder must be kept in a shaker, or similar receptacle.

18. Creams and other semi-solid substances must be taken from the container with a sterile spatula or other sterile object. Removing such substances with the fingers is prohibited.

19. Cosmetics must be removed from the skin by means of sterile cotton pledgets, gauze, towels, paper tissues, or other sterile materials.

20. Failure to observe sanitary rules and regulations is punishable by a fine. Gross continued negligence to observe

sanitary rules and regulations shall justify the revoking of a license.

Every operator should have a knowledge of State Board of Cosmetology and State Board of Health rules and regulations for the practice of cosmetology in her state; of bacteria, and of their growth and harmful properties; of the different methods of sterilization and sanitation, and of the time required to render sterile the instruments and articles used in her work; of the effect of moist and dry heat on microorganisms; of the composition and effect of chemicals and vapors on microorganisms, equipment, instruments, and articles used in the shop; of the construction of a cabinet or vapor sterilizer, and the character and amount of chemicals to use therein; and of the corrosive effect of certain chemicals on instruments, wires, connections, joints, electrodes, and so forth.

An operator should have the ability to observe all safety precautions; to mix all kinds of sterilizing solutions; to prepare the proper sterilizing agent for the particular object used; to sterilize her hands, the patron's skin, and all objects, instruments, and linens according to State Board of Cosmetology and State Board of Health rules; and to estimate the cost of materials used in sterilizing solutions and the time required to prepare them.

If the skin has been properly cleansed before a treatment is given, and if all instruments and articles used have been properly sterilized, a serious infection is not likely to occur in the shop. A slight prick or cut, however, *may* develop into a serious infection owing to the activities of disease-producing bacteria.

Bacteria

Bacteria are vegetable microorganisms found in air, water, and soil, and in the bodies of animals and plants. The lower forms are simple one-celled masses of protoplasm without a nucleus. Some of them are able to move about by means of flagella (a whip) or cilia (a hairlike process). In the human body bacteria are found principally in the mouth, intestines, stomach, and superficial layers of the skin. They may be

admitted to the body through abrasions of the skin, by inhalation into the respiratory passages, and by swallowing into the digestive tract.

Saphrophytes are bacteria that live on lifeless organic matter. **Parasites** are bacteria that live on living tissues. Bacteria are called **pathogenic** (disease-producing) and **non-pathogenic** (harmless).

Bacteria are classified, broadly, according to shape, as follows:

1. **Bacilli**, rod-shaped.
2. **Spirilli**, spiral-shaped.
3. **Cocci**, spherical-shaped.

a. **Streptococci**, occurring in pairs or chains, are found in blood poisoning, scarlet fever, erysipelas, certain forms of septicemia, and so forth.

b. **Staphylococci**, occurring in bunches or clusters, are found in localized abscesses, pustules, and boils.

Bacteria reproduce by simple division and propagate so rapidly, thriving on living tissue, that one bacterium may produce countless descendants within a few hours. Bacterial reproduction depends, among other possible factors, upon proper nourishment, warm temperature, absence of sunlight, proper moisture, and proper chemicals.

The spores which some bacteria are capable of producing increase the difficulties of complete sterilization, as the spores may survive the sterilizing process after the less resistant forms of the same bacteria have been destroyed. A **spore** is a nucleated mass of protoplasm, often without a cell wall, a fact which enables an organism to survive extremes of heat and cold. Spores are capable of growth into a new individual when favorable conditions arise, and they have great tenacity of life, having been known to survive boiling and freezing temperatures. The anthrax bacillus is a spore-forming organism which is found in animal hides. As it may thus be present in the bristles of hair brushes, brushes should be guaranteed to be sterile before they are purchased by an operator. Bacteria which do not produce spores are more easily destroyed by the sterilizing process.

When pathogenic bacteria enter the body, they reproduce themselves and set up a condition known as infection. **Infection** may be defined as the communication of disease from one organism to another. An **infectious disease** is any disease caused by the entrance into the body and the multiplication of pathogenic bacteria. It may or may not be contagious. A **contagious disease** is a disease communicated by germs carried in the air or water, and may be spread without contact between individuals. A **communicable disease** is one which may be transmitted from one person to another, such as tuberculosis, influenza, and syphilis. The hands of an operator are potential agents for the carrying of disease germs from one part of the body to another and must, for this reason, be always in a sterile condition when serving a patron. The **vulnerable points** of infection in the human body are the mucous membranes of the nose, mouth, throat, and alimentary canal, the sweat gland openings, the hair follicle openings, and broken epidermis of cuts, wounds, and so forth.

The tuberculosis bacillus is seldom communicated through the openings of the skin. Tetanus (lockjaw) is caused by a toxin produced by the *Clostridium tetani*, a bacillus which usually enters the body through a wound in the skin. Syphilis, a contagious venereal disease, is caused by a microorganism, the *Spirochaeta pallida*, which is generally propagated by direct venereal contact, by unclean instruments, common towels, drinking cups, and so forth, and by inheritance. *An operator should avoid contact with any sore on the body of a patron.*

Immunity is a condition of security or preparedness against the invasion of any specific disease. This condition may be **congenital**, that is, possessed at birth and transmitted from parents. Such an inherited condition may be the natural possession of a race or of a group. **Acquired immunity** is a condition that is spoken of as **natural** when the condition is acquired without any effort or purpose. An acquired immunity can be produced **artificially** by the injection of preparations of specific bacteria. This is done in the vaccination against smallpox, typhoid fever, and diphtheria. An acquired immu-

nity may be **passive**, a condition conferred by the injection of serum from an individual or an animal when the donor has acquired an active immunity against the specific disease. Such an immunity, not acquired in the system, is transitory. **Active** immunity is the condition produced by the activity involved in the tissues and cells and fluids of a person or an animal during the successful battle between those factors and the bacteria of an invading disease.

Agencies for the destruction of bacteria may be classified as natural, which include sunshine and drying-out processes, and artificial, such as the processes of sterilization.

Sterilization

The term **sterilization** is applied to the act or process of sterilizing, and also to the state of being sterile (free from microorganisms, especially pathogenic bacteria).

The term **sanitation** implies rendering sanitary or the use of sanitary measures designed to secure and preserve health.

Hygiene is the science of health and its preservation.

Prophylaxis (meaning "to guard") is the prevention of disease, or preventive treatment to guard against disease.

The state of being free from infection is called **asepsis**. Poisoning by the products of a putrefactive process is called **sepsis**.

Sterilizing Agents Used in Cosmetology

Sterilizing agents are effective only with certain bacteria. All bacteria are not equally resistant; one kind of germicide will not destroy all microorganisms.

1. **Alcohol**. Source: a colorless liquid made by distillation of fermented fruits or grains, and by fermentation of sugar. A 50-75 per cent solution will kill most bacteria in 15 minutes, but alcohol of any strength will not destroy spores. It is used in beauty shops for sterilizing the hands, instruments, and objects which cannot be or are not subjected to other forms of sterilization. It is also used for sterilizing the patron's skin in electrolysis.

2. **Phenol** (carbolic acid). Source: coal tar. It is a solid

crystalline substance. It will not injure fabrics, metal, or paint, but it may dull the sharp edges of instruments. "Solution of carbolic acid" purchased from the druggist is usually 10 per cent, and this must be reduced to a 5 per cent solution for sterilizing combs, brushes, and so forth. Ordinary vegetative bacteria can be destroyed in a few minutes when a 5 per cent solution is used; spores require a few hours in a solution of this strength. Carbolic acid is a deadly poison and, therefore, great caution should be exercised in its use and care. A strong solution applied to the skin may cause a serious burn, and its somewhat aromatic odor may be disagreeable to a patron.

3. **Cresol.** Source: coal tar. Lysol (trade name) is a compound solution containing 50 per cent cresol. Cautions for its use and directions for making solutions are given on the label. It will not rust or corrode metal, but it will usually irritate the skin, and its odor may be disagreeable to some persons.

4. **Bichloride of mercury.** Source: salt of mercury. This is a deadly poison and great caution should be exercised when handling it and using it as a sterilizing agent. It is colorless and odorless; in tablet form it may or may not contain a coloring agent. In proportions of 1 to 1000 it will destroy forms of bacteria in 30 minutes; a stronger solution of 1 to 500 will kill spores in the same length of time. Directions for making solutions are given on the label. As it is irritating to the skin, stains linen, and corrodes metal, and because of its poisonous character, it is not in general use in beauty shops.

5. **Solution of formaldehyde (formalin).** Source: the oxidation of wood and alcohol. Formaldehyde is a gas soluble in water. "Solution of formaldehyde" or formalin is an aqueous solution which contains not less than 37 per cent, by weight, of absolute formaldehyde. It is a nearly colorless liquid with a pungent odor; its vapor may act as an irritant to mucous membranes. It does not stain or injure fabrics, but it will rust some instruments, such as scissors and nail clippers, unless glycerine has been added to the solution. Full-strength solution is used for cabinet or vapor sterilizers,

and solutions of from 4 to 10 per cent for chemical sterilization in wet sterilizers.

6. **Iodine.** Source: ashes of seaweed and mother-liquors of Chilean sodium nitrate. It stains, irritates the skin, and injures metals. Tincture of iodine is used as a skin antiseptic.

7. **Germicides and antiseptics,** derivatives of phenol, cresol, pine oil, and other products, manufactured and sold under trade names, may be used in beauty shops as sterilizing agents or antiseptics if they are bacteriologically effective, conform to the laws governing the practice of cosmetology, and comply with the rules of the State Board of Health in the state in which they are used.

8. **Hydrogen peroxide** may be used as an antiseptic.

9. **Boric acid solution** may be used for sponging the face and for eye pads.

10. **Formalin solution,** 1 per cent, may be used for sponging the face and the armpits. A 2 per cent solution may be used for the hands.

Methods of Sterilization Used in Cosmetology

The methods of sterilizing take two forms:

1. Heat:

a. **Moist.** Boiling for 20 minutes, exposing to steam for 20 minutes, or steam under pressure, according to the directions of the pressure apparatus.

b. **Dry.** Baking for 20 minutes (rarely used), or holding in a flame until heated to a high temperature.

2. **Chemicals.** Immersing in a sterilizing solution for a specified time to complete sterilization.

Vapors are the fumes of chemicals (as in a solution of formaldehyde) which are allowed to circulate in air-tight containers as an additional or secondary sanitary measure to keep sterilized articles germ-free.

Common **yellow laundry soap** with warm water is a good agent for the removal of bacteria, but this cannot be relied upon to destroy the bacteria and make an object germ-free.

Germicides are preparations for the destruction of bacteria.

Antiseptics are preparations used to prevent the multiplication and growth of bacteria.

Disinfectants are preparations for destroying bacteria. A disinfectant is not intended for use upon the living body, but upon places, objects, and materials containing disease-producing bacteria.

Cabinet sterilizer. Use one teaspoonful of solution of formaldehyde. To prevent the rusting of instruments, add one teaspoonful of glycerine. A larger quantity of the solution and glycerine should be used for large cabinets.

Wet sterilization (boiling; steaming). A kettle of sufficient size, preferably of enamel ware, should be used. To the water add one teaspoonful of sodium carbonate to prevent the rusting of instruments. Sterilization should be completed in 20 minutes.

Wet sterilization (chemical). Use a solution of from 4 to 10 per cent formalin, or a solution containing an effective sterilizing agent. A tightly covered container of enamel ware or glass must be used for the sterilizing process. Wash combs, brushes, and instruments with soap and water, rinse, and place in the wet sterilizer for 20 minutes.

Wet sterilization for manicure table (chemical). Use a solution of not less than 4 per cent formalin, or alcohol 50-75 per cent strength, or a solution containing an effective sterilizing agent which is not irritating to the skin. When a manicure is to be given, take the manicuring instruments from the cabinet sterilizer and place the nippers, scissors, orange stick, and so forth, in the wet sterilizer on the manicure table so that they may be kept germ-free in the process of giving a manicure. These instruments are never placed on the table, but are *always* returned to the wet sterilizer when not in actual use in giving a manicure. After the manicure has been given, sterilize the instruments and place them in the cabinet sterilizer. This method of wet sterilization is used for tweezers, epilation forceps, and other like instruments which come in contact with the skin.

An equipment container for students. Students in a school of cosmetology, using their own instruments, combs, brushes,

hairpins, and so forth, must keep the container and its contents properly sterilized. The container should be provided with a disinfectant, such as a solution of formaldehyde, as an additional or secondary sanitary measure.

Rubber capes, textbooks, and so forth, must be kept in a separate container.

Shop Rules and Precautions

1. Do not place hairpins in your mouth. Do not carry your comb in your uniform pocket. Do not carry hair nets in your cuff or uniform pocket.

2. Keep waste containers covered; use them for all waste.

3. Keep the cabinet sterilizer air-tight and the dust-proof containers clean and closed.

4. Cleanse all objects before sterilizing them, and place them in a cabinet sterilizer or air-tight or dust-proof container until ready for use.

5. Keep bottles and jars labeled, corked, and covered.

6. Replenish jars of sterilizer regularly with fresh chemicals.

7. Select chemicals with care when sterilizing equipment with wires, joints, and electrodes.

8. Keep the wet sterilizer clean and dry when not in use.

9. Give heat or chemicals sufficient time to destroy microorganisms.

10. Use care in handling hot instruments and articles; guard the eyes against chemicals; guard the skin and clothing from burns and stains.

11. If an article is dropped to the floor, do not use it until it has been sterilized.

12. If a case of pediculosis is found, great caution must be observed in sterilizing immediately and thoroughly all objects that have come in contact with this so-called skin disease.

13. Report all unsanitary conditions to your instructor or shop manager.

14. All articles should be freed from hair before being subjected to sterilization.

15. All linens, instruments, and articles must first be steri-

lized and then placed in a dust-proof or air-tight container or in a cabinet sterilizer.

16. Linens, such as towels, chair cloths, and so forth, should be boiled.

17. Cotton, gauze, neck strips, and other accessories should be kept in a dust-proof container.

18. Articles and instruments which are not boiled or submitted to other methods of sterilization should be washed with soap and water and placed in a wet sterilizer (chemical).

19. Instruments with cutting edges and glass electrodes should be cleansed, immersed in alcohol solution, and placed in a cabinet sterilizer.

20. Electrodes, carbon or metal, should be wiped off with a sterilizing solution.

21. The teeth of clippers should be brushed with alcohol or kerosene.

22. Rubber shampoo capes should be wiped off with soap and water, rinsed with clear water, thoroughly dried, and placed in a dust-proof container.

23. Metal tables and shampoo trays should be washed with soap and water, rinsed, dried, and wiped off with a sterilizing solution.

24. Felt protectors should be freed from hair, washed with soap and water, rinsed, dried, and wiped off with sterilizing solution.

25. Hair nets and hairpins should be washed with soap and water and immersed in a wet sterilizer (chemical).

26. Marcel, bob curl, and paper curl irons are rendered sterile when submitted to a flame, or to a high temperature in an electric stove.

27. Solutions should be changed regularly in wet sterilizers, and fresh solutions placed in cabinet sterilizers as often as necessary.

**PROPORTIONS (APPROXIMATE) USED IN MAKING
SOLUTIONS FROM FULL-STRENGTH OR 100 PER CENT
STERILIZING AGENTS**

1% solution....	5 drops to 1 oz. water or 1 teaspoonful to 12 oz. water.
2% solution....	10 drops to 1 oz. water.
4% solution....	4 teaspoonfuls to 12 oz. water.
5% solution....	25 drops to 1 oz. water or 5 teaspoonfuls to 12 oz. water.
10% solution....	10 teaspoonfuls to 12 oz. water.

Formalin Solutions

Solution of formaldehyde usually contains from 37 per cent to 40 per cent of absolute formaldehyde. For this reason the proportions for making formalin solutions differ from those used for making solutions from 100 per cent or full-strength sterilizing agents. A 40 per cent solution of formaldehyde is commonly used.

When a 40 per cent solution of formaldehyde is used, the proportions are as follows:

1% solution..	1 part	solution of formaldehyde to 39 parts water.
2% " ..	2 parts	" " " " 38 " "
4% " ..	4 "	" " " " 36 " "
5% " ..	5 "	" " " " 35 " "
10% " ..	10 "	" " " " 30 " "

When a 37 per cent solution of formaldehyde is used, the proportions are as follows:

1% solution.	1 part	solution of formaldehyde to 36 parts water.
5% " ..	5 parts	" " " " 32 " "
10% " ..	10 "	" " " " 27 " "

TABLE OF EQUIVALENTS

60 drops	= 1 teaspoonful.
8 teaspoonfuls	= 1 ounce.
1 glass	= 8 ounces.
1 pint	= 16 ounces.
1 quart	= 32 ounces.

Questions

1. Why is it necessary that sterilization and sanitation be practiced in a beauty shop?
2. Will an instrument or article remain sterile if exposed to the air for long? How should it be protected?
3. How may disease be transmitted in a beauty shop?
4. What is the danger in the common use of towels, soap, combs, brushes and like articles?
5. Give some ways in which disease may be prevented in the shop.
6. What is meant by "sterile" hands, linens, instruments, and articles?
7. What are your State Board rules regarding floors, woodwork, and furniture in beauty shops?
8. Name the pieces of equipment necessary to maintain sanitary conditions in a shop.
9. For what purposes are covered containers used?
10. What is a cabinet sterilizer? For what purpose is it used?
11. What process must an instrument or article undergo before being placed in a cabinet sterilizer?
12. What is the law regarding the use of phenol and corrosive sublimate in the practice of beauty culture?
13. Why is it important that an operator be free from disease?
14. What are the dangers of using styptic pencils and lump alum to arrest bleeding?
15. What kinds of styptics may be used? How should a styptic be applied?
16. What is the sanitary rule for headrests?
17. How should towels be sterilized? Should a towel be used more than once?
18. How may coverings be prevented from coming in contact with a patron's skin?
19. How should shampoo trays and bowls be sterilized?
20. What is the rule regarding combs and brushes after having once been used?

21. What skin conditions prevent an operator from giving a scalp massage?
22. What important rule must be observed before and after serving a patron?
23. How should an operator sterilize her hands?
24. How should an operator be dressed?
25. How should lotions and fluids be applied?
26. How should creams, lotions, and other cosmetics be kept?
27. Why should powder not be kept in an open container?
28. In what manner should creams and other semi-solid substances be removed from their containers?
29. How should cosmetics be removed from the skin?
30. What penalties may be imposed for failure to observe State Board rules for sterilization and sanitation in a shop?
31. What shop practices will justify the revoking of a license?
32. What knowledge should an operator have in order to practice sterilization and sanitation in her work?
33. What abilities should she possess in order to protect her patron from infection and avoid the transmitting of disease?
34. How may a slight prick or cut during a manicure develop into a serious infection?
35. Define bacteria.
36. In what parts of the body are bacteria most often found?
37. How may bacteria be admitted into the body?
38. Define saphrophyte.
39. What is a bacterial parasite?
40. What are disease-producing bacteria called?
41. What is the term used for harmless bacteria?
42. How are bacteria classified according to shape?
43. Name the three classifications into which bacteria are divided.
44. How are cocci classified?
45. In what diseased conditions are streptococci found?

46. What bacteria are found in pustules and boils?
47. How do bacteria multiply? What conditions are favorable to their growth?
48. How do spores of bacteria increase the difficulty of sterilization?
49. Define spore. Do all forms of bacteria produce spores?
50. Name a spore-forming bacillus found in animal hides.
51. Why should brushes be sterilized before they are first used?
52. Define infection.
53. How may infection be produced?
54. What is an infectious disease? A contagious disease?
55. What is a communicable disease?
56. Name three communicable diseases.
57. What are the vulnerable points for infection of the human body?
58. Is the tuberculosis bacillus communicated through openings in the skin?
59. How does the bacillus of lockjaw find entrance into the body?
60. What is syphilis? What precautions should be taken to avoid contact with the microorganism which causes syphilis?
61. What is meant by immunity?
62. Define congenital immunity; natural immunity.
63. Define acquired immunity. How may acquired immunity be produced artificially?
64. What is meant by passive immunity? Active immunity?
65. How are agencies for the destruction of bacteria classified?
66. What is sterilization?
67. What is meant by the state of being sterile?
68. Define sanitation. Define hygiene. What is prophylaxis?
69. Name some sterilizing agents used in cosmetology.
70. What is the source of alcohol? For what purposes is it used in the shop? In what strength solution is it used?

71. What is the source of phenol? What strength solution is necessary to destroy bacteria?
72. Why should great care be taken when using carbolic acid?
73. What is the source of cresol? What is Lysol?
74. What are the disadvantages in the use of Lysol?
75. What is the source of bichloride of mercury? Why should it be used with caution?
76. What proportion of bichloride of mercury is used for the destruction of bacteria? What are its disadvantages and why is it not generally used in cosmetology?
77. What is the source of formaldehyde?
78. What are some of the advantages of formaldehyde solution?
79. In what ways is formaldehyde used in the shop?
80. What is the source of iodine? For what purpose is tincture of iodine used?
81. For what purposes is hydrogen peroxide used?
82. For what purposes is boric acid solution used?
83. What strength formalin solution is used for sponging the face and armpits? For the hands?
84. Name the methods of sterilization used in cosmetology.
85. How is sterilization by moist heat accomplished?
86. How is dry heat used for sterilization?
87. How is sterilization effected by the use of chemical solutions?
88. What are vapors? For what purpose are they used?
89. What is the value of common laundry soap in sterilization?
90. Define germicide. Define antiseptic.
91. What is the difference between a germicide and an antiseptic?
92. What is a disinfectant?
93. What solution is commonly used in a cabinet sterilizer?
94. How may the rusting of instruments in a cabinet sterilizer be prevented?
95. How is wet sterilization by boiling or steaming accomplished?
96. For what length of time should articles remain in a wet sterilizer?

97. How is the rusting of instruments prevented in wet sterilization?

98. How is sterilization accomplished with chemicals? How long should the sterilizing process continue, in order to effect complete destruction of bacteria?

99. How is wet sterilization accomplished for the manicure table?

100. How are manicuring instruments kept in a sterile condition during a manicure?

101. How should a student's equipment container be kept?

102. How are tweezers and like instruments kept in a sterile condition?

103. Why should hairpins not be kept in the mouth, nor a comb in a uniform pocket?

104. What disposal should be made of hair and waste?

105. Why is it necessary to keep waste containers covered?

106. Why should a cabinet sterilizer or an air-tight container be kept clean and closed?

107. Why should objects be cleansed before sterilizing them?

108. Where should objects be placed after sterilization?

109. How should the contents of bottles and jars be protected?

110. What precaution should be taken when sterilizing equipment with joints and wires?

111. Should a jar of sterilizer be used as long as it contains any of the old solution?

112. Should an article that has dropped to the floor be used again without sterilizing it?

113. What precaution should be taken in a case of pediculosis?

114. Where should cotton, neck strips, gauze, and other accessories be kept?

115. How should instruments with cutting edges be sterilized?

116. How are glass and other electrodes sterilized?

117. How are clippers rendered sterile?

118. How are rubber shampoo aprons cleansed, and where should they be kept?

119. How may metal table tops and shampoo trays be treated in a sanitary manner?

120. How are felt protectors sterilized?

121. How often should wet sterilizing solutions be changed?

122. When using a full-strength solution, how is 1 per cent solution made? 2 per cent solution? 4 per cent solution?

123. How are 5 per cent and 10 per cent solutions made?

124. How much absolute formaldehyde, by weight, does "solution of formaldehyde" contain?

125. Give the approximate proportions for making 1 per cent, 2 per cent, 4 per cent, 5 per cent, and 10 per cent formalin solutions, when 40 per cent solution of formaldehyde is used.

Chapter XII

CHEMISTRY IN COSMETOLOGY

Chemistry is the science that treats of matter considered as composed of atoms and their relations and affinities. Chemistry plays a conspicuous part in cosmetology; the progress of cosmetology will be largely chemical progress. A practical groundwork in this subject is necessary in order to acquire the "related science" required in the training for cosmetology as a vocation.

If a student has not had a high-school or college course in chemistry, she can take general chemistry and its branches applicable to cosmetology at a neighborhood school for adult education or enroll for an extension course at her state university.

Technical terms must be used correctly, and their meaning must be understood, in order that an operator may talk intelligently about her work and carry on research in the shop to some extent.

Definitions of Common Terms

Matter is anything that occupies space. The nature of matter is not perfectly known; its properties can only be described and speculations made on its structure. Matter is found in three different states or phases:

1. As **solid**. In this state matter has weight, volume, and shape, and does not spread into the form of the receptacle in which it is placed.

2. As **liquid**. In this form matter takes the shape of the receptacle in which it is placed, and has both weight and volume.

3. As **gas**. In this form matter takes the shape of any re-

ceptacle in which it is placed, and distributes itself uniformly throughout the space. Gas also has weight and volume.

Matter is made up of minute particles called molecules.

A **molecule** is the smallest particle of any substance which has all the properties of that substance.

An **atom** is the smallest part of the molecule of an element that can combine with other elements to form molecules.

An **element** is a substance that cannot be separated into substances different from itself by ordinary chemical processes. Oxygen, hydrogen, silver, gold, iron, zinc, and iodine, for example, are elements.

Compounds and mixtures. When elements combine to form a definite substance, the result is called a **compound**. Sugar, salt, and starch are examples. When elements or compounds are combined in a chemical sense, without any chemical change taking place, the result is called a **mixture**.

Matter can undergo two kinds of change:

1. **Physical change.** The properties but not the composition of a substance undergo change. The identity of the substance remains the same.

2. **Chemical change** consists in the change of one or more kinds of matter into one or more other kinds of matter.

Analysis is the decomposing of a compound into its elements or its compounds.

Synthesis is the making of a compound by bringing two or more elements or chemical substances into a chemical reaction.

A **chemical equation** is a form used to express the facts of a chemical change.

A **solution** is a combination of two or more substances, solid, liquid, or gaseous, usually liquid. A solution consists of a solvent and a solute.

A **solvent** is a substance capable of, or used in, dissolving something.

A **solute** is a substance dissolved in a solvent.

A **saturated solution** is a solution in which the solvent has taken up all of the substance that it can hold in solution.

An **aqueous solution** is a solution made from, or by means of, water.

A **dilute solution** is a thin or weak solution, made thinner or more liquid by admixture.

A **concentrated solution** is one which is increased in strength by diminishing the bulk. It contains a large quantity of the solute in proportion to the quantity of the solvent.

A **tincture** is a solution of medicinal substance in alcohol.

A **base** is a substance containing hydroxyl (OH) ions.

An **acid** is a substance containing hydrogen (H) ions which can be replaced by a metal or a base.

An **ion** is an electrified particle formed when a neutral atom or group of atoms loses or gains one or more electrons.

A **salt** may result from the action of an acid on a base. A salt may be described in one way as an acid in which the replaceable hydrogen ions have been replaced by a metal.

Neutralization is the combining of an acid and a base to form a "neutral" solution, which is neither an acid nor a base.

Oxides are compounds of elements with oxygen. The combining of any substance with oxygen is called **oxidation**. If the combining is accompanied by light and heat, it is called **combustion**. **Oxidizing agents** are substances that readily cause oxidation.

Reaction, in chemistry, is a chemical transformation or change; a chemical process brought about by the use of a particular reagent. A **reagent** is any substance which, from its capacity for certain reactions, is used in detecting or examining other substances.

A **symbol** is a letter, character, abbreviation, or the like, used to represent a chemical element or compound; for example, C is the symbol for carbon.

A **formula** is a symbolic expression of the composition of a substance; for example, the formula for water is H_2O . A collection of formulas is called a **formulary**.

Cosmetics

Chemistry may be applied to cosmetology in the mixing of sterilizing solutions, in the matter of cosmetics used and sold in the shop, and for selecting and judging the values and probable effects of solutions, hair dyes and bleaches, shampoos and rinses, and other preparations used in the operator's work.

The operator should know what preparations can be classed as harmless, and how to compare their actual results with the claims made in their advertising.

A **cosmetic** is any preparation, for external application, intended to beautify or improve the appearance of the skin, hair, or nails. A patron's skin may be normal, overdry, or over-oily, and her hair may be glossy and elastic or dry and brittle. Different combinations of substances used in cosmetics may help to maintain a normal condition and improve an abnormal condition of the skin, hair, or nails.

An operator should have a **knowledge** of the basic ingredients of all cosmetics used in her work and the **ability** to apply them scientifically and skillfully.

Cosmetic allergens. Physical idiosyncrasies may cause, in some persons, unfavorable reactions to certain cosmetics. Asthma, hay fever, hives, and eczema are among these allergic symptoms. It has been said that no cosmetic can be "non-allergic." Some persons may be sensitive to a substance which has proved to be not harmful in general use. Orris root is, to many persons, an allergen (the irritant which causes the illness or discomfort) which causes symptoms in the respiratory tract. Glycerine tends to take moisture from the skin, and may make a dry skin even dryer and result in roughness or chapping under certain conditions.

Cosmetics may be grouped, broadly, into **emollients**, which are softening, soothing, and protective preparations, and **astringents**, which are preparations for closing the pores temporarily and for removing cream.

Cosmetics are classified, generally, as follows:

1. **Emulsions.** Liquid mixtures in which fatty substances are suspended—usually in water, but also water in oil—such as all creams (cleansing, night, vanishing, bleaching, and massage) and hand lotions.

2. **Ointments and sticks.** These are semi-solid mixtures of lard, petroleum, wax, and other ingredients, to which, for ointments, a medicinal agent is added. Ointments are used for scalp treatments and for skin affections: for example, sulphur, zinc oxide, and tar ointments. Sticks are usually heavy oint-

ment mixtures which are colored and perfumed and poured into molds to harden, such as lipsticks and eyebrow pencils.

3. **Powders**, such as face, toilet and bath, deodorant, and depilatory powders.

4. **Pastes**, consisting of fats and oils bound together with mucilages and starches, such as rouge paste, nail whitener, and others. Mucilage, used in cosmetics, is usually an aqueous solution of gum karaya or tragacanth, or a mucilaginous substance prepared from linseed or quince seed with water.

5. **Solutions**, consisting of a solvent and a solute. These are usually clear mixtures which will not separate on standing. Alcohol is used as a solvent in many solutions; water is capable of dissolving more substances than any other solvent. Cosmetic solutions include hair tonics, hair rinses, astringent and skin-toning lotions, hand lotions, boric acid solution, cuticle removers, liquid brilliantines, and permanent waving solutions.

6. **Suspensions**. Substances in which the particles of a solid are mixed with, but undissolved in, a fluid, such as a liquid powder and calamine lotion.

Creams

Creams for the skin are made of vegetable oils (such as olive, almond, sesame, or peanut), animal oils (such as lanolin or benzoinated lard), or mineral oils or jellies, in various combinations, with water and perfume and with or without saponified and emulsified waxes (such as beeswax, spermaceti, ceresin, or paraffin), and preservatives. Waxes do not contribute to the cleansing and lubricating purposes for which creams are applied to the skin. They are used only to stiffen the oil base of a cream. Mineral oil, petrolatum, and other products derived from distilled petroleum differ, as far as cosmetic effect is concerned, largely in solidity. Lanolin is a fatty mixture obtained from the wool of sheep. Hydrous lanolin contains about 30 per cent water. Cocoa butter is sometimes used in night creams. It is made from the oil of the cacao bean.

Cleansing creams are usually made of mineral oils solidified with petroleum jellies or waxes which liquefy at a low temperature. Others are emulsions with water. The oils or fats

dissolve the natural oil, perspiration, and dirt so that they may be removed and the skin left soft and clean. Some of the requirements of a good cleansing cream are as follows: (1) it should liquefy at body temperature; (2) it should spread easily; (3) it should leave the skin without trace of greasiness; and (4) it should be easily removed.

Night creams. These are lubricating creams which should keep the skin soft and flexible and prevent dryness and scaliness following exposure to weather. Because of their heavier bases, night creams remain longer on the skin than cleansing creams. Materials used in the manufacture of night creams include cocoa butter, benzoinated lard, cholesterol, cetyl alcohol, lanolin and absorption bases derived from it, mineral oil, petrolatum, vegetable oils, waxes, preservatives, water, and perfume.

Foundation creams are made by different formulas. They are used as a powder base and foundation for make-up. A good foundation cream should cling to the skin and prevent perspiration from displacing the make-up. When color is added, the product is called a **foundation tint**.

Astringent creams. Substances having astringent properties are added to cream bases to make creams which are useful in the treatment of overoily skin and for temporarily contracting large open pores.

Vanishing creams are made with a soap base, and may contain oils. They form a coating on the skin, and are used for a powder base. When face powder is added to a vanishing cream base, the product is called a **cream powder**.

Rolling massage creams are made by adding, usually, casein (a compound found in milk; the principal ingredient of cheese) to a cream base.

Bleaching creams have a limited function. Ammoniated mercury, or other effective bleaching agent, is added to a cream base. Other materials, such as acetic acid, hydrogen peroxide, zinc and magnesium peroxides, and bismuth subnitrate, are sometimes used.

Hand creams are greaseless preparations which should not leave the skin sticky or moist. They contain materials which

soften and smooth the skin and prevent roughness and chapping. Cocoa butter, tincture of benzoin, cetyl alcohol, lecithin, sodium lauryl sulfonate, and mucilage of quince seed or gum karaya are among the materials commonly used.

Massage Oils

Oils used in facials (for massage, oil mask, and so forth), manicures, scalp treatments, and like purposes are usually made with a vegetable or mineral oil base, perfume, and, if necessary, a preservative.

Powders

Face powders. While the texture of the skin cannot be changed, powders may be used to improve its appearance. They may be soothing to an irritated surface, and to some extent they afford protection against the drying and roughening effects of sun and wind. All types of face powders do not, however, have the same effect on all textures of skin, and an operator should know when to recommend powder of different grades and coverage. Dry skin requires a light powder; normal skin, one of medium weight. For an overoily skin, a heavier powder should be used. For the shiny, overoily places on some normal skins, such as the chin, nose, and forehead, a heavy powder may be used and one of lighter coverage applied to the less oily areas.

Face powders are classified as light, medium, and heavy (referring to their covering power). Powders are of different degrees of fineness, depending upon the mesh of the screen or bolting silk through which they are sifted in their manufacture. Materials commonly used in compounding powders are the stearates, chalk, zinc oxide, kaolin, talc, titanium dioxide, and so forth. Face powders are obtainable in a wide variety of shades.

Toilet or bath powders. Talcum is the most commonly used base for these powders which are used after shaving or the bath, and for soothing an irritated surface of the skin. Talcum is a hydrated silicate of magnesium found, in its finest

qualities, in France, Italy, Austria, and the United States. Talcum, being a mineral, is not affected by moisture.

Liquid powders are suspensions made by adding a whitening agent, such as is used in face powders, to a solution containing alcohol. The evaporation of the alcohol leaves a deposit of powder on the skin.

Rouges

Rouge is prepared in different forms, such as paste, cream, dry, liquid, and compact powder rouge. Paste rouges are usually mixtures of fats and waxes, colored and perfumed. The dyes used for coloring should be those licensed for use as coloring matter in foods by the United States Government. Cream rouges differ from paste rouges in their susceptibility to evaporation. They are usually of the emulsion type, but a vanishing cream type is also made. The essential of all types of paste and cream rouges is that they be easy of application. Compact and dry rouges are made with a dry powder base bound together with a mucilage or similar ingredient.

Lip rouges are usually heavy ointment mixtures of waxes and fats, with other ingredients, colored and molded in various shapes. The principal requirements of a lip rouge are: (1) it must not contain harmful ingredients; (2) it must spread easily without leaving the lips shiny or greasy; (3) it must not crumble on the lips; and (4) its color must be reasonably permanent. Waterproof rouge forms a transparent film on the lips which will not be affected by moisture. Lip rouge should never be applied over a scratch or cut on the lips.

Lotions

Skin-toning lotions, or "skin fresheners," are mildly astringent preparations of alcohol, alum, glycerine, witch hazel, boric acid, ethylene glycol, aromatic spirits of ammonia, lactic acid, or other ingredients in various combinations. The tingling sensation felt after their application is due to the presence of a chemical with astringent properties. They are used after

the skin has been cleansed and massaged to remove all traces of cream before the foundation for make-up (which may be a cream, tint, or lotion) and make-up are applied.

Astringent, or "finishing," lotions are more highly astringent than skin-toning lotions. Astringents of too strong character, however, will lessen the secretions of the oil and sweat glands and tend to increase the dryness of a dry skin. Astringent lotions are used for overoily skin, coarse pores, and other abnormal conditions.

Calamine lotions are usually suspensions made up of calamine, zinc oxide, glycerine, and water. They are soothing to the skin.

Sunburn lotions are of preventive or remedial character. A preventive lotion consists of a filtering agent, such as menthyl salicylate, with alcohol and glycerine or oil, which prevents harmful effect from the sun's rays and permits a mild and even tanning of the surface of the skin. Remedial sunburn lotions are soothing preparations for the purpose of healing sunburned skin.

Hand lotions provide some lubrication and have a softening effect on dry, rough, and chapped hands. They are usually emulsions of soap, gum karaya, quince seed, stearic acid, alcohol, and similar ingredients to which lanolin and glycerine are sometimes added.

Hair-waving, or wave set, lotions have, as a base, a hair fixative such as gum karaya, gum tragacanth, flaxseed, or glycerine, with alcohol, perfume, and color added. A good waving lotion will not flake upon drying. Such lotions can be used successfully only when their composition and weight are considered in relation to the condition and texture of the hair to which they are applied.

Manicuring Preparations

Cuticle remover, the function of which is to soften the cuticle and make it easy to remove, is usually made up of trisodium phosphate, water, glycerine, and perfume. Potassium hydroxide is also used.

Cuticle softener. Cholesterin and sulfonated castor oil, with waxes, petrolatum, and other materials are used in its making.

Nail bleach, or nail white, is available in paste and liquid forms. Its function is to remove stains and discolorations from under the free edge of the nail. The bleach paste usually has a base of mineral oil and petrolatum, with zinc oxide, titanium dioxide, and talc.

Liquid and enamel nail polishes are of various types. Some of the ingredients used are: acetone, amyl acetate, ethyl acetate, ethyl alcohol, nitrocellulose, and ether. The effect of lacquers and enamels upon the fats of the keratin in the nails should be taken into consideration.

Nail polish pastes, creams, and powders are made of petrolatum, lanolin, tin oxide, zinc oxide, titanium dioxide, cetyl alcohol, waxes, and so forth, in various combinations.

Nail polish remover usually has an acetone base with ethyl acetate, or it may be prepared with isopropyl alcohol and acetone.

Depilatories

A **depilatory** is an agent for removing or destroying hair. Depilatories are sold in the form of liquids, powders, pastes, and wax epilatories, and are of two types. The wax epilatory type consists of waxes and resin, and, when warmed and applied, will harden and bring the hair with it when it is removed. The liquid and cream types contain chemicals which possess depilatory properties, such as the sulfides of barium, sodium, or strontium, for dissolving the hair. Many persons are allergic to these chemicals, and therefore a patch test should be made before the depilatory is applied.

Deodorants

A **deodorant** is a preparation for destroying odors or for inhibiting the functions of the sudoriferous glands, or for both purposes. Deodorants are of two types. One type, containing an antiseptic, is designed to deodorize perspiration without preventing its flow. The other type, the chief ingredient of

which is usually aluminum salts, is intended to deodorize and also to restrict the flow of perspiration by its astringent effect on the sudoriferous glands. A deodorant should prevent the products of bacteriacidal action, should neutralize body odors, and should not irritate the skin. Commercial deodorants are available in liquid, powder, and paste forms. Materials commonly used are: boric acid, formaldehyde, zinc salicylate, zinc sulfocarbonate, zinc sulfide, aluminum salts, and alum. Dry types of deodorants are mostly suitable for deodorizing perspiration. The liquid and paste types more readily exert astringent action by their penetrative qualities.

Mascara

In liquid form, mascara is usually a solution of alcohol with resin and shellac or has a soap base to which coloring matter is added.

Eye Shadow

Lanolin, petrolatum, and cetyl alcohol, with waxes and other materials, are mixed and colored in shades of blue, brown, blue-brown, gray, violet, and green.

Eyebrow Pencil

Eyebrow pencils are usually made with an ointment base and colored with black pigments.

Beauty Clays

Beauty clays are applied as packs and masks for the purpose of cleansing the skin and stimulating the circulation of blood to the tissues. Inorganic substances, such as Fuller's earth and kaolin, with glycerine and witch hazel, or other astringent, are used to make a paste which is applied to the skin.

Hair Preparations

Hair tonics consist of combinations of ingredients such as quinine sulphate, tincture of cantharides, potassium carbonate, resorcin, tannic acid, sulphur, balsam Peru, and alcohol.

Hair oils. Light mineral oil and benzoinated oil are usually used in the making of oils for the hair, as they do not become rancid.

Bay rum is a fragrant liquid prepared by dissolving the oil distilled from the leaves of the bayberry in alcohol and water. Oil of orange peel and oil of pimenta are sometimes added.

Hair pomades may be hard or soft. Lanolin and vaseline are common bases used. Medicated pomades are used for dandruff and some abnormal conditions of the scalp.

Brilliantines are available in liquid and solid forms. They are usually made with a base of paraffin jelly, or with mineral or vegetable oils. Liquid brilliantine may be light or heavy. The light type can be sprayed over the hair with an atomizer. The jelly type consists of an oil base with wax to give it body. Brilliantines are used to give the hair gloss and to keep it in place.

Rinses

Hair rinses are of two types: coloring rinses, which are used to brighten or color the hair temporarily; and acid rinses, such as vinegar and lemon, for softening the hair by removing soap film on the hair shaft after a shampoo. An operator should know what result to expect from the application of a coloring or acid rinse to the hair. Rinses are discussed further in Chapter XV.

Soaps

Soap is a cleansing agent made, usually, by the action of alkali on fat. The fatty acids used in soap making are stearic (from animal fat), oleic (from animal and vegetable oils), and palmitic (from palm tree oils). Common alkalies used are potassium and sodium hydroxide. When these chemical compounds are combined in definite proportions, different types of soaps are the result.

Toilet soaps are usually prepared in cake form and are blends of mild fats and oils to which perfume is added.

Transparent soaps are made by the addition of glycerine and sugar to the soap mixture.

Floating soaps are made by whipping air into the mixture during the making.

Green soap is made from linseed oil and potash. It is a soft soap.

Castile soap is made with olive oil and alkali. The amount of olive oil used is regulated by law.

Shaving soaps are usually cocoanut oil soaps. Cocoanut oil makes the freely lathering soap which is necessary for softening the hair in shaving.

Water

Hardness of water is caused by the salts of lime and magnesium present. Temporary hardness is due to bicarbonate of lime and magnesium in solution. To remove temporary hardness, the water may be boiled. This will cause the lime to settle in the bottom of the boiler. Permanent hardness is due primarily to the sulphates of magnesium and calcium contained in the water. Boiling will not remove them.

The minerals in hard water will retard the lathering of soap and will have a tendency to leave a deposit on the hair shaft. Borax and soda are harmless water softeners; borax is better for the purpose than soda. A simple method for softening water is by distillation, though this is not a practical one for the shop. Commercial water softeners may be used.

By soft water is meant water that is free from soluble mineral salts. Soap used with soft water lathers freely and leaves no deposit on the hair.

Questions

1. Define chemistry.
2. What part does chemistry play in cosmetology?
3. Why is a groundwork in chemistry necessary to the practice of cosmetology?
4. Define matter. In how many different states is matter found?
5. What is a solid?
6. What is a liquid?

7. In what way does a gas differ from a liquid and a solid?
8. Define molecule.
9. What is an atom?
10. What is an element? Name several elements.
11. What is a compound? What is a mixture?
12. How many changes can matter undergo?
13. What is a physical change? A chemical change?
14. What is the meaning, in chemistry, of the word *analysis*?
15. What is synthesis?
16. What is a form used to express the facts of a chemical change called?
17. What is a solution? Of what does a solution consist?
18. Define solvent. Define solute.
19. What is meant by a saturated solution?
20. What is a solution made from water called?
21. What is a dilute solution?
22. What is a concentrated solution?
23. What is a tincture?
24. What is a base?
25. What is an acid?
26. What is an ion?
27. What is a salt?
28. What is meant by neutralization?
29. What are oxides?
30. What is oxidation? What is combustion?
31. What are substances that readily cause oxidation called?
32. What is meant by a chemical reaction?
33. What is a reagent?
34. What is a symbol, in chemistry?
35. What is a formula? What is a collection of formulas called?
36. How may chemistry be applied to cosmetology?

37. Define cosmetic.
38. For what purposes are cosmetics used?
39. What knowledge should an operator have, and what ability should she possess, to use cosmetics properly?
40. How do certain cosmetics affect persons with physical idiosyncrasies to substances which they contain?
41. Can any cosmetic be said to be non-allergic?
42. Name some well-known allergens found in cosmetics. What is an allergen?
43. What may be the effect of glycerine on the skin?
44. Into what two broad groups have cosmetics been divided?
45. What is the effect of an emollient on the skin?
46. What is the effect of an astringent preparation on the skin?
47. For what purposes are astringents used?
48. How are cosmetics classified generally?
49. What are emulsions? Name several cosmetics of the emulsion type.
50. What is an ointment? For what purposes is it used?
51. Name some ointments used for scalp treatments.
52. How are sticks made?
53. Name some types of powders used as cosmetics.
54. How are pastes made?
55. What cosmetics are made in paste form?
56. For what purposes are gum karaya and tragacanth used in cosmetics?
57. Name two ingredients used in preparing mucilaginous substances.
58. For what purpose is alcohol used in making solutions?
59. Name several cosmetic solutions.
60. What are suspensions? Name two cosmetics made in the form of suspensions.
61. How are creams made? Name the bases used.
62. Name some waxes used in creams.

63. How do the products derived from distilled petroleum used in creams differ?
64. What is lanolin? What is meant by hydrous lanolin?
65. How is cocoa butter made?
66. Name the different kinds of creams.
67. How are cleansing creams made?
68. Give some of the requirements of a good cleansing cream.
69. For what purposes are night creams used?
70. What materials are used in the manufacture of night creams?
71. Name some substances used in astringent creams.
72. For what purposes are astringent creams used?
73. How are vanishing creams made? What is their action on the skin?
74. What are bleaching creams?
75. Name some materials used for bleaching the skin.
76. For what purposes are hand creams used?
77. Can the texture of the skin be changed by the use of any cosmetic?
78. For what purposes are face powders used?
79. Why should an operator know when to recommend a powder of proper grade and coverage for her patron's skin?
80. What type of powder is best for a dry skin?
81. What type of powder should be used for an oily skin?
82. How are face powders classified?
83. Name some of the materials used in making face powders.
84. What is the most commonly used ingredient for making bath powders?
85. What is talcum powder, and where is it found?
86. How are liquid powders made?
87. By what process do liquid powders leave a deposit on the skin?
88. In what different ways is rouge prepared?
89. What are paste rouges? How do cream rouges differ from paste rouges?

90. How are compact and dry rouges made?
91. Of what do lip rouges usually consist?
92. What are the principal requirements of a lip rouge?
93. What is the action of waterproof rouge on the lips?
94. Should lip rouge be applied over a scratch or cut on the lips?
95. How are skin-toning lotions prepared?
96. For what purposes are skin-toning lotions used?
97. What is the effect of using overstrong astringent lotions on the skin?
98. For what purposes are astringent, or "finishing," lotions used?
99. What are calamine lotions, and what is their effect on the skin?
100. Of what do sunburn lotions consist? For what purposes are they used?
101. Give the purposes of hand lotions, and name some of the ingredients used in their preparation.
102. Name some of the bases used in wave set lotions.
103. What is the principal characteristic of a good wave set lotion?
104. Name the preparations used in giving a manicure.
105. What is the function of cuticle remover? Name some ingredients used in its manufacture.
106. What materials are used in cuticle softener?
107. In what forms are nail bleach or nail white prepared?
108. What is the function of nail bleach?
109. What are the principal ingredients of a nail bleach?
110. Of what ingredients are liquid or enamel polishes made?
111. How may lacquer or enamel polishes affect the nails?
112. In what different types are nail polishes made?
113. Name some ingredients used in nail polish powders, pastes, and creams.
114. What is the common base used for a nail polish remover?
115. Define depilatory.
116. In what forms are depilatories sold?

117. Why should a patch test be made before a liquid or cream depilatory is applied?
118. What is a deodorant?
119. Name two purposes for which deodorants are used.
120. In what forms are commercial deodorants sold?
121. What is mascara?
122. What ingredients are used in eye shadow preparations? What shades may be obtained?
123. How are eyebrow pencils made?
124. For what purposes are beauty clays applied to the skin?
125. What beneficial effects may be derived from the application of hair tonics?
126. Name some common ingredients of hair tonics.
127. What kind of oils are used for hair oils?
128. What is bay rum?
129. What are the common bases used for hair pomades?
130. In what forms are brilliantines sold?
131. For what purposes are brilliantines used?
132. Name the two types of hair rinses used in cosmetology.
133. What is soap? How is soap made?
134. Name the fatty acids used in soap making.
135. From what sources is stearic acid obtained? Oleic acid? Palmitic acid?
136. Name two common alkalies used in making soap.
137. How are toilet soaps prepared?
138. What substances are added to a soap mixture to make transparent soap?
139. How are floating soaps made?
140. From what ingredients is green soap made?
141. How is castile soap made?
142. What is a common ingredient of shaving soaps?
143. Why is cocoanut oil a good base for a shaving soap?
144. What causes hardness of water?

145. To what is temporary hardness of water due?
146. How may temporary hardness be removed?
147. To what substances is permanent hardness of water due?
148. How does hard water affect soap, and what effect will it usually have on the hair?
149. Name two harmless water softeners.
150. What is meant by soft water?
151. Why is soft water better than hard water for shampooing the hair?

Chapter XIII

ELECTRICITY IN COSMETOLOGY

Electric appliances used in the practice of cosmetology include permanent waving machines, manicuring machines, eyebrow arching machines, hair dryers, hair clippers, the wall plate, high-frequency apparatus, steamer, vibrator, therapeutic lamps using white, blue, and red carbon-filament bulbs, infra-red lamps, mercury-vapor and carbon-arc lamps for ultraviolet rays, single- and multiple-needle holders for electrolysis machines, electrolytic cup, and body-contouring equipment.

An operator should understand the use of electric currents and the proper methods of their application in her work. She should not attempt to connect electric equipment until she has made certain that her appliance is designed for both the voltage and the cycles of the electricity supply and for the type of current (direct or alternating) supplied to the shop. Most beauty shop equipment is designed for 110 volts and 60 cycles.

Because many beauty culture practices require the use of electric currents, it is imperative that the fundamentals of electricity as applied to cosmetology be thoroughly mastered before an attempt is made to use such a powerful agency in working on living tissues. Textbooks on the subject should be studied thoroughly, and the instructions supplied by manufacturers of electric appliances should be carefully followed. Failures in services in which electricity is used are due largely to insufficient knowledge of its fundamental principles, to unskillful technique in operation, to the use of the wrong form of current for the service given, and to inferior equipment.

Electricity cannot be defined. It is an agency to which are due numerous phenomena. Many of these phenomena result from action in a magnetic field. Electricity in motion is

dynamic; when chemically developed, it is called voltaic. Static electricity is produced as stationary charges.

Electricity may be generated chemically or mechanically. Electric currents are classified, according to the effects they produce, as chemical, mechanical, and thermal.

Definitions of Common Terms

A circuit, in electricity, is the path of an electric current. When no break exists to prevent the flow, the circuit is closed. When a break occurs, an open circuit results. The path used by the electric current from its source, a battery or a generator, and back to its source, is called a complete circuit.

A circuit requires a pair of conductors connecting power source with appliance. When the ground is used for one of these conductors, it is called a ground circuit.

When the current is being used, a short circuit may occur. A short circuit happens when, through a defect in wiring, an excess amount of current is permitted to flow from one wire to another and blows or melts a fuse. It is for this reason that all appliances should be protected by fuses of proper rating to prevent damage to the apparatus and shock to the patron. Two of the most common causes of short circuits are frayed cords and carelessness in making connections. It is not good practice to pull a plug out by the cord.

A fuse is a device placed in an electric circuit for the purpose of safety. When the current increases beyond the rated capacity of the fuse, the metal in the fuse melts, breaking the circuit and thus preventing damage to the apparatus. Fuses are rated according to the current they will carry.

Electric currents may be direct or alternating. By direct current is meant one that flows continuously in one direction. A direct current may be produced chemically by cells or mechanically by generators. By alternating current is meant one which acts first in one direction and then reverses the direction of its action at regular intervals. Alternating currents are produced mechanically by magnetos, and they flow in cycles. A cycle is a complete positive and negative wave of an alternating current.

A **generator** is a machine for converting mechanical energy into electrical energy.

A **battery** is an apparatus for generating voltaic electricity, consists of one or more cells, and produces a direct current. When a battery is constructed with liquid chemicals, it is called a **wet-cell battery**; when dry chemicals are used, it is called a **dry-cell battery**.

A **rectifier** is a device for converting an alternating current into a direct current.

A **transformer** is a device for transforming an alternating current from a high to a low potential, or vice versa.

A **meter** is a device for indicating the flow of electric energy.

A **milliammeter** indicates the flow of current in milliamperes.

A **rheostat** is a device for regulating the current-strength of electricity.

A **volt** is a unit of electromotive force.

An **ampere** is a unit for measuring electric-current strength. **Amperage** is the strength of an electric current measured in amperes. A **milliampere** is the thousandth part of an ampere.

The **watt** is the unit of electric power. It takes approximately 746 watts to make one **horsepower**.

The **ohm** is the unit of electrical resistance. It takes one volt of pressure to drive one ampere of current strength through one ohm of resistance in one second of time. This statement is known as **Ohm's Law**, the mathematical expression of which is $E=IR$, in which E represents the electromotive force, in volts; I , the intensity of the current, in amperes; and R , the resistance, in ohms.

A **conductor** of electricity is a substance or body through which an electric current will flow. Some of the best electric conductors are silver, copper, gold, aluminum, and zinc.

A **nonconductor** is a substance which does not transmit electric currents, or which transmits them with difficulty; an **insulator**. Rubber, silk, glass, cement, dry wood, asbestos, and so forth, are nonconductors of electricity.

By **insulation** is meant the covering or wrapping of electric wires with nonconducting material for the purpose of safety.

Conducting cords are insulated wires by which current is conducted from the wall plate to the electrodes.

An **electrode** is an appliance which makes an electric current available for contact with the part of the body under treatment. Forms of electrodes for the wall plate include: comb, brush, massage roller, wrist or arm, and carbon cylinder. The high-frequency apparatus includes: scalp or comb electrode, facial electrodes (metal ones for indirect application), and also an electrode for removing warts, moles, and other skin blemishes.

A **binding post** is a metallic post attached to an electric apparatus for convenience in making connections. These posts are also called **terminals** or **poles**.

A **selector switch** is a switch attached to a wall plate for selecting the current to be used for the treatment.

Wall Plate

A **wall plate** is a device used to adapt the current supplied by the city lighting plant to the requirements of the electric appliances used in the shop. Wall plates are of different sizes and structure. Some of them are fastened to the wall; others are of a portable type. All wall plates supply galvanic and faradic currents, and some of them are made for high-frequency and sinusoidal currents also. The currents obtainable are known as **chemical** (galvanic), **mechanical** (faradic), and **thermal** (high-frequency). Parts of a wall plate include: a rheostat, a selector switch, binding posts, a milliampere meter, a rectifier, and a faradic coil. Accessories include: a connection cord, conducting cords, and electrodes.

Polarity

Polarity is the term used for the effect, positive or negative, on the opposite electrodes of a cell, battery, or the like.

The **positive pole** (P. or +) is that pole of a battery which yields positive electricity. The **negative pole** (N. or —) is that pole from which negative current flows and toward which positive current flows.

Tests for polarity. It is very important that the polarity of the electrodes be determined before a facial or scalp massage with galvanism is attempted. The **water test**. Connect the conducting cords to the binding posts and turn the selector

switch to "galvanic current." Place the free tips of the cords in a glass of water (fresh or salt). A short circuit will occur if the tips are not kept apart. Turn the rheostat until the current produces bubbles at each cord tip. The negative pole will show more bubbles than the positive pole, and the bubbles will show considerable activity. The bubbles which collect at the positive pole will cling closely to the cord tip. The litmus test. Moisten a strip of litmus paper and apply the electrodes to the paper a short distance apart. The paper under the positive pole will turn red; that under the negative pole, blue.

Galvanic Current

The galvanic current is an uninterrupted electric current, the action of which is chemical. Galvanism is the use of this current for remedial purposes. The process of forcing solutions through the unbroken skin into the underlying tissues by means of the galvanic current is called **phoresis**. The positive pole, called the **anode**, is used for forcing solutions, such as astringents, into the tissues. This process is called **cataphoresis**. The use of the negative pole, the **cathode**, for forcing liquids into the tissues, as in applying a bleach, is called **anaphoresis**.

The galvanic current is used in treatment by means of electrodes, one of which is held by the patron while the other electrode is brought in contact with the skin. A polarity test should always be made before the galvanic current is used in order to determine which pole is positive and which one negative. Galvanic current is never transmitted through the operator to the patron by means of a wrist electrode.

Effects of the use of the chemical reaction of the positive pole, which is acid, are as follows:

1. Reducing of large pores.
2. Attraction of oxygen, resulting in hardening and tightening of skin tissues.
3. Constriction of blood vessels (vaso-constriction).
4. Soothing effect upon painful conditions.
5. Germicidal effect from its acid reaction.

6. Stoppage of bleeding.

Effects of the use of the chemical reaction of the negative pole, which is alkaline, include:

1. Attraction of oxygen.
2. Stimulation of tissues by increase of blood supply (vasodilation).
3. Irritation, sometimes aggravating an inflammation.

The negative pole is used for the removal of superfluous hair and warts, moles, and other growths.

Faradic Current

The faradic current is a magnetically induced current of electricity. Faradism is the stimulation of nerve or muscle tissue by means of induced currents of low frequency. Because of the "making and breaking" of the current, the polarity of the faradic current is non-determinable.

Scalp and facial massage utilize the faradic current. The wrist electrode is applied to the wrist of the operator, and the carbon cylinder electrode is held by the patron. Thus, the electricity is transmitted through the operator's hands to the skin of the patron during the massage. The massage is given with the current flowing. The voltage used should be carefully regulated to assure comfort to the patron.

The purposes for which the faradic current is used are stimulation, muscular exercise, increase in muscle tone, increase in blood supply, and increase in glandular activity.

Sinusoidal Current

Sinusoidal currents are so called because their path follows a sine curve, or part of a circle. They are alternating currents, wavy and oscillating, with no definite polarity. They have great power of stimulation; a little current will stimulate, and continued use will produce overstimulation or fatigue. Sinusoidal currents are applied in the same manner as faradic currents. They have, however, the power of deeper penetration than the faradic, and a more soothing effect on the nerves.

They are used for scalp and facial massage and for reducing weight and improving muscle tone.

High-Frequency Current

Frequency, in electricity, means the number of complete cycles of current produced by an alternating-current generator per second. The high-frequency current is made to pass through a glass electrode, and is used for massaging the skin. The three types of high-frequency currents now in use are named for their discoverers, Telsa, Oudin, and d'Arsonval. Telsa high-frequency is generally used in beauty culture services. It is a current of medium voltage and medium amperage. The other two types are used in the practice of medicine.

High-frequency current may be applied by the direct method, in which the operator applies the current through an electrode directly to the parts under treatment; or by the indirect method, in which the patron holds the electrode while the operator manipulates the skin with her finger tips. When using the indirect method, the current should be turned on after the patron has grasped the electrode and turned off before the electrode is taken from the patron's hand.

A high-frequency current may be direct, pulsing at a very high rate, or alternating, reversing the direction of its flow at a very high rate. To facilitate the movement of the electrode, the skin may be covered with cream or oil; but tonics, lotions, or oils containing inflammable or combustible substances must never be used. The polarity of the high-frequency current is non-determinable.

High-frequency current may be used:

1. With massage in scalp treatments, by the direct or indirect method of application.
2. For additional stimulation in a plain facial.
3. To remove skin blemishes and growths, such as warts and moles, by fulguration, which is "destruction by flashing." The method may be direct or indirect. By the direct method, an insulated fulguration electrode with a metal point delivers a spark of electricity directly to the area under treatment. By the indirect method, the patron holds a glass or metal

electrode while the operator sparks the area with the fulguration electrode.

Some of the effects of high-frequency currents upon skin tissues are: stimulation of circulation, absorption, and elimination; relief of congestion; increase of glandular activity; and germicidal action.

The Therapeutic Lamp

A **therapeutic lamp** is an electric appliance used to produce lights for corrective treatments in cosmetology. The bulbs commonly used are carbon-filament bulbs of 12 and 32 candle power, in white, blue, and red colors. When using these lights, the following **precautions** should be observed:

1. Protect the patron's eyes with witch hazel or boric acid pads.

2. Direct the light so that the rays will fall on the part under treatment. The light may be raised or lowered, but it should never be placed closer than 18 inches from the patron's skin.

3. The treatment should last from 5 to 15 minutes, no longer.

The **white light** has the effect of sunlight to a certain degree, and is a combination of other colors. It is said to produce the following effects:

1. Destruction of germs.
2. Relief of pain in congested areas.

The **blue light** is deficient in heat rays and is not highly penetrating, although it is said to possess some chemical properties. It is usually used directly over the bare skin, and is claimed to have the following effects:

1. Acts as an antiseptic and tonic.
2. Irritates the skin.
3. Soothes the nerves.

The **red light** is used over cream or oil in treating dry and scaly skin conditions of the face, arms, and hands. It penetrates the tissues more deeply than the blue light, and is supposed to have the following effects:

1. Heats the surface of the skin.
2. Stimulates the circulation of the blood.
3. Stimulates glandular secretion.
4. Irritates the nerves.
5. Aids in absorption of creams and lotions by the skin.

Infrared Rays

Infrared rays are rays of energy beyond the limit of vision and below the red rays. They are produced by special generators and are used for bleaching the skin, facials, packs, scalp treatments, oil treatments, treatments for dry and brittle hair, and for aiding the skin to absorb lotions and creams. Infrared rays are said to have the following effects on body tissues:

1. Stimulation of metabolism.
2. Relief of pain.
3. Increase of glandular secretions.
4. Dilation of blood vessels.
5. Heating of the tissues to high temperature without increasing the general body temperature.
6. Relaxation of muscular tissue.

Ultraviolet Rays

Ultraviolet ray therapy is the province of the advanced cosmetologist. These powerful rays are the invisible rays of the spectrum which are beyond the violet rays. By means of a carbon arc or a mercury-vapor lamp, ultraviolet light is used for diseases, such as psoriasis, acne, tinea, and seborrhea, and for promoting hair growth. The rays are produced by a transformed electrical current which is passed through a vacuum tube containing mercury. When the mercury is vaporized by the current, radiation begins. Ultraviolet ray appliances should not be confused with others on the market which produce only violet rays.

The Electrolytic Cup

An **electrolytic cup** is a device of hard rubber to which three metal tubes—two inlet and one outlet—are attached. The

galvanic current is used, and a test for polarity must always be made. One inlet tube is connected with the conducting cord of the negative pole, while the other one is connected with the supply tank, which contains a solution of warm water and a chemical such as soda, alum, boracic acid, or salt. The outlet tube leads from the cup to a waste receptacle, which should contain enough water to cover the end of the tube in order to effect the suction necessary for the cleansing process of the massage.

Electrolytic cup massage is given for the purpose of removing comedones and milia, and as a preliminary for facial massage. The patron holds an electrode connected with the conducting cord of the positive pole. After nearly all the cleansing cream has been removed from the skin, the cup, held with the thumb and index finger and steadied by the middle finger, is moved slowly over all parts of the face. The stream of warm solution collects waste matter, consisting of dust particles, sebum, perspiration, and castoff epithelial cells, and discharges it through the outlet tube into the waste receptacle. The type of solution used depends upon the skin under treatment. Boracic acid solution may be used for a sensitive skin, soda for tanned and oily skin conditions, and alum for tightening the tissues of flabby or wrinkled skin.

The cup should be sterilized before and after using by cleansing with hot water and soap and dipping into a sterilizing solution.

The Vibrator

The vibrator uses the electric current to drive the motor instead of for remedial purposes. It is used for massaging the skin. By increasing the supply of blood to the parts under treatment, it has a stimulating effect on skin tissues and on glandular secretions. It may be used by applying a rubber applicator directly to the skin, or it may be used indirectly by transmitting the vibrations through the fingers of the operator. This is accomplished by placing the applicator on the back of the operator's hand, or by the use of a wrist applicator.

The Steamer

The steamer is used instead of hot towels in scalp treatments. It is an electric apparatus which furnishes warm steam to the part under treatment. The steamer will prepare the scalp for the application of hot oil.

Questions

1. Name some electric appliances used in cosmetology.
2. What special knowledge should an operator have in order to use electric equipment with safety?
3. What voltage is commonly used in the shop?
4. Why is it necessary to have a knowledge of the fundamentals of electricity before using electric appliances?
5. To what factors are failures in the use of electric currents in the shop due?
6. What is electricity?
7. What is electricity in motion called?
8. How is voltaic electricity produced?
9. Define static electricity.
10. Name the two ways in which electricity is generated.
11. How are electric currents classified according to the effects they produce?
12. What is the path of an electric current called?
13. What is an open circuit?
14. What is a closed circuit? What is a complete circuit?
15. What is a ground circuit?
16. What is a short circuit? What happens when a short circuit occurs?
17. Name two common causes of short circuits.
18. What precaution should be taken when making connections?
19. What is a fuse? For what purpose is a fuse used? How are fuses rated?
20. What is meant by a direct current? How is it produced?
21. What is meant by an alternating current? How is it produced?

22. What is a cycle? What form of current flows in cycles?
23. What is a generator?
24. What is an electric battery?
25. What is the difference between a wet-cell battery and a dry-cell battery?
26. What kind of current does a battery produce?
27. Define rectifier.
28. What is a transformer?
29. What is a meter? A milliammeter?
30. Define rheostat.
31. What is a volt?
32. What is an ampere? A milliampere?
33. What is the unit of electric power called?
34. How many watts make one horsepower?
35. What is an ohm? Give Ohm's Law.
36. What is a conductor of electricity? Name several conductors.
37. What is meant by a nonconductor? Name several.
38. What is meant by insulation? Why is insulation necessary?
39. What are conducting cords?
40. What is an electrode?
41. Name some forms of electrodes used with a wall plate.
42. What types of electrodes are used with the high-frequency apparatus?
43. What type of electrode is used for indirect application?
44. What are binding posts? By what other names are they known?
45. What is a selector switch?
46. Describe a wall plate.
47. What currents does a wall plate supply?
48. Name the parts of a wall plate.
49. Name some accessories used with a wall plate.

50. Define polarity.
51. Do all electric currents have the same polarity?
52. Why is it necessary to make a test for polarity before using galvanic current?
53. How is a water test for polarity made?
54. How is a litmus test made?
55. Define galvanic current.
56. Define galvanism.
57. What is the polarity of the anode?
58. For what purpose is the positive pole used?
59. What is this process called?
60. By what other name is the negative pole called?
61. What is anaphoresis?
62. Tell how the galvanic current is applied to the patron.
63. What action does the galvanic current have on skin tissues?
64. Give some results from the use of the positive pole.
65. Why does the positive pole have a germicidal effect?
66. What results may be obtained from the negative pole?
67. What is the chemical reaction of the negative pole?
68. Define faradic current; faradism.
69. Why is the polarity of the faradic current non-determinable?
70. Name some beauty shop services in which the faradic current is used.
71. How is the faradic current applied to the skin?
72. For what purposes is the faradic current used on the skin?
73. What is the sinusoidal current?
74. How is the sinusoidal current applied?
75. For what purposes are sinusoidal currents used?
76. How do the effects produced by the sinusoidal current differ from those produced by the faradic current?
77. What is the meaning of "frequency" in electricity?
78. For what beauty culture service is the high-frequency current used?

79. Name the kinds of high-frequency currents now in use.
80. Which type is commonly used in a beauty shop? How are the other types used?
81. What is the voltage and amperage of the Tesla high-frequency current?
82. By what different methods may the high-frequency current be applied?
83. What is the difference between the direct method and the indirect method of using high-frequency currents?
84. Is the high-frequency current a direct current or an alternating current?
85. Why should inflammable liquids never be used with the high-frequency current?
86. Is the polarity of the high-frequency current determinable?
87. How is high-frequency current used in scalp treatments?
88. For what purpose is high-frequency current used in facials?
89. Define fulguration. For what purpose is it used in cosmetology?
90. How is high-frequency current applied by the direct method in removing skin blemishes and growths? By the indirect method?
91. Name some effects obtained by using high-frequency currents upon skin tissues.
92. Describe a therapeutic lamp.
93. What precautions should be used with therapeutic lights?
94. Which one of the lights has the effect of sunshine? What effects does the white light produce on skin tissues?
95. What is the blue light? Name some effects said to be produced by the blue light.
96. For what purposes is the red light used?
97. What are infrared rays?
98. For what purposes are infrared rays used?
99. What effects do infrared rays produce on body tissues?
100. What are ultraviolet rays? How are they produced?
101. Name some diseases which are said to be improved by ultraviolet ray treatments.

102. Describe the electrolytic cup.
103. For what purposes is the electrolytic cup used?
104. What is an electric vibrator?
105. For what purposes is a steamer used in cosmetology?

Chapter XIV

HAIRCUTTING

Haircutting is the shortening, thinning, and shaping of hair with the shears or a razor. Clippers and hair-thinning shears may be used to obtain certain effects. A haircut is given for the purpose of removing hair and shaping the hair to the contour of the head, and also to make the hair easier to arrange and to give a more lasting hairdress.

The **type** of haircut will depend upon the style of hairdress desired, and the hairdress should depend upon the physical characteristics of the patron. The operator should note: the height and weight of the patron; the texture and thickness of the hair; the contour of the head (round, flat, or bulging); the front and back views and profile; the crown (high, low, or flat); the forehead (high or low); the space behind the ears (wide or narrow); and the natural neckline. She should then attempt to cut and contour the hair so that the patron's best points will be emphasized. Natural imperfections, such as prominent cheek bones, hollows in the cheeks, large, wide noses and long, thin ones, mouth, chin, and ear defects and peculiarities, can be made to some extent inconspicuous by the haircut and hairdress.

To give a proper haircut, an operator should have a **knowledge** of: sterilization and sanitation; common diseases and abnormal conditions of the scalp and hair; anatomy of the head; structure of hair; tendencies of hair growth; and modern methods of dressing the hair.

An operator should have the **ability** to: sterilize instruments; give proper "patron's protection"; visualize the effect she wishes to achieve; use haircutting instruments with speed and skill to cut, shape, shingle, trim, thin, taper, and feather-edge hair to the contour of the head and in the prevailing

mode; cut hair to be worn straight or to be waved while wet or iron-curled; cut hair to be permanently waved; modify any style of hairdress; and copy modes from drawings and charts.

The frequency of a haircut depends upon the rate of hair growth. From two to three weeks is the average length of time. Trims should be given during this period.

Ways of Cutting Hair

A **neck trim** is a cutting and shaping of the hair at the neckline. The hair may be featheredged, by using the point of the shears and the fine part of the comb. A **long-bob trim** means shortening the hair by slithering. The neckline should not be changed unless the patron desires it. Clippers may be used to cut and shape the hair closer to the head.

A **bobbed haircut** is one in which the hair is cut off straight, from shoulder length upward. By bobbing or clubbing is meant the cutting or trimming of the hair to equal lengths without thinning or tapering. This procedure gives a clubbed effect which is used where an even line instead of a tapered one is desired.

A **windblown cut** is shaped to the head in the same manner as a plain haircut, except that the back is shingled to conform to the length cut around the face. The ends are tapered and drawn toward the face.

A **shingle** is cut close to the scalp at the neckline, and gradually longer as the shears move upward. No definite line or ridges should remain. For a **boyish bob**, the hair is tapered over the head, cut straight at the sides, and shingled at the back. The clipper may be used on the back and at the side.

Featheredging, also called *shingling*, is the term applied to clipping and tapering the hair at the neckline to eliminate a definite line. The point of the shears is used instead of the full blade. The fine teeth of the comb are slanted into the hair at the hairline, and the comb is slanted out from the neck as it is moved upward. The hair is cut very short at the hairline, and gradually left longer for a short distance above. Ragged edges, nicks, and full spots can be smoothed by tilting the comb outward, just below the portion to be worked

on, and cutting the hair where necessary to even the contour of the cut.

A **layer haircut** is cut in layers (which are not cut straight across) that are tapered and slithered to fit the head. A thin layer of hair is held up from the head and the shears are moved from the fingers toward the scalp. The layers are of graduated lengths and the ends are finely tapered. The layer method is advised for very fine hair, and for producing a strong wave in naturally curly hair. **Stripping**, in which the shears enclose the strand at an oblique angle, is used in layer haircutting.

Thinning the hair. Hair is thinned for the purpose of shaping it to the contour of the head and encouraging the wave in naturally curly hair. The effect will be a decrease in its thickness and weight, which will tend to shape it neatly to the head. The amount of thinning depends upon the texture and thickness of the hair and the style of hairdress desired. Thinning or cutting shears or a razor may be used. Part the hair in about a one-inch layer from the part. Take a small strand in the left hand and slither the hair about two or three inches from the scalp. The hair may be thinned in this way over the entire head, parting the hair in sections or layers. Care should be taken that the hair is not cut too close on top and on the rounded part of the head.

Tapering the hair shortens and thins it at the same time. The hair is cut in graduated lengths, becoming thinner toward the ends. Tapering should produce a smooth and even hair cut, and is always advised when a tailored hairdress with curled ends is desired.

Slithering, sometimes called the *effilé* method, is the tapering of hair to graduated lengths. The shears are moved back and forth on the under part of the strand, cutting a few hairs at a time. The outside hairs may or may not be cut.

Ruffing means that the full length of the strand is thinned and shortened.

Razor shaping and thinning. The hair should be damp; dry hair will dull the blade and the hair will be pulled. The hair is parted into sections. The razor is held in an almost

flat position and the blade drawn downward along the strand with quick strokes. The more nearly upright the blade is held, the more hair will be removed. A long stroke will remove less hair than a short one. The razor may be used in this manner on the top of the strand or underneath. Weeks of practice are required to learn to move a razor steadily and skillfully along a strand of hair.

Finger work. Small sections of hair should be taken, slanting upward from the scalp. The hair is held between the first two fingers; bring the fingers out to the point where the hair is to be removed; the fingers should be held in a slightly rounded position. Cut the hair with one sweep of the scissors. This process may be used to remove ridges and long, uneven lengths, and for cutting hair in layers for ringlets over the head.

Cutting the hair for a permanent wave. The hair may be slithered, or may be cut and shaped by the finger-work method. The hair may be cut, shaped, and thinned before the permanent or cut and tapered while the hair is in the blocks. Thick areas must be thinned to blend evenly with other parts of the hair; stubby ends will not produce ringlet ends, and thick hair is difficult to wave and dress. Hair of all textures should not be tapered in the same way. Fine hair should be tapered well to produce a strong curl; coarse hair, if tapered too finely, will result in too strong a curl. Tapered hair wraps more easily than stubby hair and will have a greater natural tendency to curl.

Necklines. The natural neckline should be carefully noted. Only when the hair grows too low on the neck or too far out on the sides should the natural neckline be altered by the haircut. A short neck may be made to appear more graceful by changing from a low hairline to a higher one. Thick necks may be made to appear more slender by raising the hairline at the sides and cutting a point at the center. Rounded necklines are best for long thin necks. Empty spaces behind the ears must be covered, and the hair must be left long enough and thick enough to fill the space. Necklines are classified as: one-point (V-shaped), two-point, and three-point; long-

point, short-point, and broad-point; and round, oval, straight, and natural. The clipper should not run into the natural neckline; featheredge the natural growth.

Bangs are short, tapered hair cut across the forehead. The hair is parted about an inch back of the hairline, combed forward, and cut straight across the top of the eyebrow or in any style desired. The hair may be thinned and tapered, depending upon its thickness and the effect desired. Begin at the outer edge of the eyebrow and cut toward the center.

Singeing. Hair is singed for the purpose of removing split ends. Singeing curls the ends into a soft ball. Dripless tapers should be used, and the hand held between the taper and the head. The hair is sectioned, and a small strand is twisted tightly from scalp to end, and the strand ruffed gently to free the ends from the longer hairs. The flame is moved slowly from the ends to the scalp to singe all protruding ends of hairs, the fingers of the left hand following to extinguish the flame. *Great care* should be used in handling a taper; the flame must not come in contact with loose hair. The strand must be twisted very tightly. After the singeing, rub the hair with a towel to remove burned ends, and brush and comb the hair well.

Cutting a Wave

Cutting the hair only shortens its length. No external influences can change straight hair to curly hair or affect the growing hair beneath the surface of the scalp. Referring to the *curly haircut*, the *scissors haircut*, and other methods of *cutting a wave*, Charles J. Kutill and Marie H. Callahan have said:¹

. . . It has long been known that where a natural wave tendency exists in the hair, it can be developed by reducing the *weight* which destroys that wave tendency. Usually, when the length and thickness of hair are reduced by proper thinning and cutting to eliminate the pull which straightens out the hair, the degree of waviness developed is in direct ratio to the amount of natural wave tendency

¹ Kutill, Charles J., and Callahan, Marie H., *Modern Beauty Shop Magazine*, June, 1938, p. 35.

in the hair. The French term for such a procedure is *effilé*; it is practiced in this country in methods known as "tapered hair shaping," "layer hair cutting," and others.

The hair of a member of the Caucasian race is described as wavy in contrast to the straight hair of the Indian or Chinese. But there is a wide variation in the amount of natural waviness found in individual members of the race. The reasons that the French *effilé* method or the various methods of hair shaping used in this country to develop the natural wave tendency have not become universally popular heretofore is that in the majority of cases such development of the natural wave tendencies is *insufficient* for practical coiffure needs. Permanent waving has proved practical, and today permanent waving remains the *only* known method of producing *immediate* results for present-day hairstyling needs.

Rules and Precautions

1. Before and after every haircut, wash your hands.
2. Keep all instruments in a cabinet sterilizer when not in use.
3. Sterilize the clipper after each haircut by brushing the teeth with alcohol.
4. Wipe the shears between haircuts with sterilizing solution. Alcohol is best for this.
5. Do not give a haircut to a patron who has a disease of the scalp.
6. Be sure that the chair is locked; help the patron from the chair.
7. Be careful when using sharp-edged instruments. You will irritate or cut the patron's neck with the clipper if you use too much pressure.
8. Do not use the clipper over moles or warts; use the shears, and proceed very cautiously.
9. Use a fresh neck strip for each patron, and keep it in place.
10. If a patron asks for a slight trim, give her a slight trim.
11. Allow one inch for a marcel, finger wave, comb wave, and other waves.
12. Do not remove too much hair; comb frequently, so that you may watch the progress of the haircut.

13. Use the shears only for cutting hair; a dull blade will not make a clean cut.

14. Practice constantly; arm and hand muscles must acquire strength and dexterity in order to use haircutting tools well.

15. Learn to move the clipper into the hair with the proper speed. If too fast, the clipper will pull; if the blade is not kept in motion, a ridge will result. Pass the clipper through all the hair to make a clean cut.

16. Pick up the hair with the comb, moving upward and outward from the head, so that the hair will not slip from the comb and a ridge result.

17. Give a shampoo after a haircut rather than before, so that the lines of the patron's present hairdress will not be lost in the shampooing. An after-shampoo will remove all loose hairs. A shampoo may be given first if a new style is to be adopted. After the hair has been restyled, more hair may be removed.

18. Do not take too large a strand when thinning hair. Do not thin over the ears if the hair is expected to cover them. Do not thin too much in one place, or near a parting.

19. Bumps and depressions should be concealed. Leave the hair long over a prominence; thin it if it is too thick there. Leave the hair thick and fluffy over a hollow place on the head.

20. A cowlick in the shingled part of the hair should be cut over the comb. Hold the comb with the points downward, and shingle the hair over the comb.

21. Do not cut permanently waved hair straight across the wave; taper and thin it.

22. For an upward-trend hairdress, remove the weight of the hair which would cause it to drop, by thinning and tapering.

23. In hot weather, dry the perspiration on the scalp and hair under the cool air of the dryer. Powder the neck so that cut hairs will not cling to moist skin.

24. Remove all loose hair from the neck with the neck-duster or a piece of sterile cotton.

25. Rules for minimizing physical defects:

a. Do not expose a long neck by giving a shingle or bob cut. Leave the hair longer.

b. For a narrow head, thin at the back and leave tapered, fluffy hair at the sides.

c. For a broad head, thin the hair at the sides and leave fluffy at the back.

d. For a short, round head, do not give a bob with a round neckline. Taper the neckline to a point.

e. For a head that is flat at the back, taper the hair fluffily to round out the contour.

Haircutting Instruments

Haircutting requires the following tools: cutting shears, thinning shears, clipper, razor, haircutting comb, brush, and neck duster.

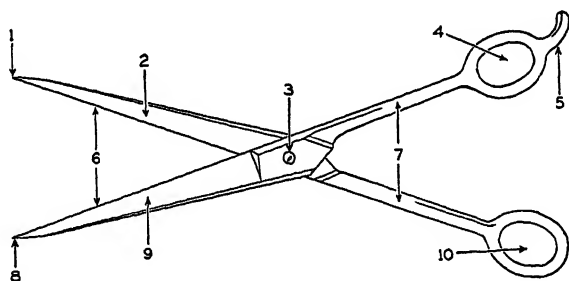


FIG. 19. HAIRCUTTING SHEARS.

- | | |
|--------------------|------------------|
| 1. Moving point | 6. Cutting edges |
| 2. Moving blade | 7. Shank |
| 3. Pivot and screw | 8. Still point |
| 4. Finger grip | 9. Still blade |
| 5. Finger brace | 10. Thumb grip |

The cutting shears should be all steel, correctly balanced; the fingers should move loosely in the grips. The most commonly used sizes are 7 and 7½ inches with rather fine points and the blades flat. Left-handed shears may be purchased for the use of a left-handed operator.

Hair clippers are either of hand or electric type, in different

sizes which range from 1 to 1000, each having its definite use. No. 1 size makes the longest cut. The hand clipper is much slower in action than the electric type, and its proper handling should be mastered before the electric clipper is used. An electric clipper of light weight and quiet type should be chosen, with thumb control for changing the size of the cut while the clipper is being used.

Haircutting combs come in different sizes and patterns. The comb should be smoothly finished and highly polished, and should pick up all the hair as it passes through a strand. A comb with rough edges will not do this, and the strand will have to be gone over a second time. A flexible comb will fit closely to the scalp.

The brush chosen should be one that can be sterilized without injury to the bristles and that will give long service.

GIVING A HAIRCUT

Supplies.²

Shears	Neck strip
Comb	Chair cloth
Neck duster or cotton pledgets	Powder

Preparing the patron.

1. Adjust the chair to the proper height.
2. Seat the patron; place neck strip and chair cloth.
3. Comb the hair in the style the patron desires.
4. Push the hair upward so that it may fall in natural lines.

Giving the haircut.

Precautions:

1. Hold the shears with the thumb and fourth finger in the grips, the little finger on the brace, and the two first fingers bracing the shank. Keep the two first fingers motionless and slightly bent—never straight.

²Supplies that come in direct contact with the patron in this, as in every other manipulative procedure, must be sterile.

2. Hold the clipper with the forefinger resting on the set screw to steady and guide it. Place the clipper flat at the base of the neck, tilt it gradually until the clipper rides on the heel of the still blade.
3. Hold the comb parallel with the blade of the shears, the four fingers on one side, the thumb resting on the back, just below the first finger. The comb should turn easily, and always point upward. Tilt the back of the comb to rest against the head.
4. Stand slightly to the left of the shear work, to command a view of the exact point of operation.

Procedure:

1. Part the hair evenly and in the proper place.
2. Cut the sides the length desired.
3. Shape the back to blend with the sides.
4. Part the hair down the center to the nape of the neck.
5. Part across the crown from ear to ear.
6. Pin up the hair and shingle or shape it low on the head and neck.
7. Featheredge the neckline.
8. Use neck duster and powder the neck.

Clean up.

1. Sterilize instruments and place in cabinet sterilizer.
2. Shake and fold chair cloth.
3. Remove hair from the floor.

Questions

1. Define haircutting.
2. For what purposes is a haircut given?
3. Upon what does the type of haircut depend?
4. What points should be noted before giving a haircut?
5. Name some physical imperfections that may be improved by a becoming haircut.
6. In order to give a haircut, what should an operator know?
7. What abilities should an operator possess in order to cut hair?

8. Upon what does the frequency of a haircut depend?
9. Name some of the different ways of giving a haircut.
10. What is a neck trim?
11. What is a bobbed haircut? What is meant by club cutting?
12. In what ways does a windblown differ from a plain haircut?
13. What is meant by shingling the hair?
14. What is featheredging?
15. What is a layer haircut?
16. For what hair texture is layer haircutting advised?
17. What is meant by stripping a strand of hair?
18. Why is it necessary to thin hair?
19. Upon what does the amount of thinning depend?
20. What instruments are used for thinning hair?
21. Describe the process of thinning hair.
22. What is meant by tapering hair?
23. Does tapering the hair thin it or shorten it?
24. Should the hair be dry for razor cutting?
25. What is meant by slithering?
26. What is the *effilé* method of cutting hair?
27. What is meant by finger work?
28. What is the most important part of the finger work?
29. Should hair be shaped before or after a permanent wave?
30. Should hair of all textures be tapered to the same extent before a permanent wave?
31. What is meant by "ruffing" a strand?
32. Should a natural neckline always be altered?
33. In what way may necklines be altered to improve the appearance of a haircut?
34. Should a round neck be given a low neckline?
35. Should a V-shaped neckline be given to a patron with a long thin neck?
36. How are necklines classified?

37. How is a V-shaped neckline cut?
38. How are bangs cut?
39. In what way does singeing affect the ends of hair?
40. Will singeing promote hair growth?
41. What special precautions should be taken when singeing hair?
42. Describe the process of singeing hair.
43. How would you cut split ends?
44. What is meant by "cutting a wave"?
45. Can the structure of hair be changed by external influences?
46. How can a natural wave tendency in the hair be developed by cutting?
47. Does the weight of hair have a tendency to straighten it?
48. What is the rule for sterilizing clippers?
49. How may shears be kept sterile in a busy shop during the day?
50. Should a haircut be given to a patron who has a disease of the scalp?
51. What precaution should be taken regarding the chair?
52. Why should pressure not be used when cleaning up the neck with the clipper?
53. Should the clipper be used over moles and warts?
54. Under what conditions may the clipper be used on the skin?
55. What precaution regarding neck strips should the operator observe?
56. How much hair should be allowed for a marcel or finger wave?
57. How should the clipper be used to make a clean cut?
58. If the clipper is used too fast, what will be the result?
59. Should the clipper blade be kept in motion while in the hair?
60. What is the proper way to pick up the hair with the comb?
61. Should a shampoo always be given before a haircut?
62. Why is it best not to give a shampoo before cutting the hair?
63. Why is it best not to thin the hair over the ears?

64. How may a bump on the head be concealed?
65. How would you cut hair over a depression?
66. How should a cowlick in shingled hair be cut?
67. Should permanently waved hair be cut across the wave?
68. How may hair be cut for an upward-trend hairdress?
69. How may haircutting be made easier in hot weather?
70. Give some ways for cutting hair to minimize defects in the contour of the head.
71. Name the tools used for haircutting.
72. Name the parts of which cutting shears are composed.
73. Name the different types of hair clippers.
74. Why should the hand clipper be learned before the electric clipper?
75. How should a haircutting comb be made?
76. Where should an operator stand when cutting hair?
77. Why should hair be combed frequently during the hair cutting?
78. How should haircutting shears be held?
79. How should the clipper be held?
80. How should the clipper be used at the neck?
81. Should the clipper blade stop moving while in the hair?
82. How should the comb be held?
83. Name the supplies used in giving a haircut.
84. Briefly describe the process of giving a haircut.

Chapter XV

SHAMPOOING AND RINSING

The principal purpose of a shampoo is to cleanse the hair and scalp. The exercise given the scalp muscle during the process of shampooing should increase the circulation of the blood in the vessels that supply the head and neck, and thus help to maintain the health of the scalp tissues and the normal growth and health of the hair.

In order to give a shampoo properly, an operator should have a **knowledge** of: sterilization, sanitation, and hygiene; the structure of the hair; abnormal conditions of the scalp and hair; the effect of hot and cold and hard and soft water on hair; the composition of all soaps, shampoo products, and rinses and their effects on virgin hair and on bleached and dyed hair; and the effect of artificial and hand drying on hair of all textures and on bleached and dyed hair.

An operator should also have the **ability**: to practice all safety precautions during the shampooing process; to prepare a patron and cleanse, rinse, dry, and dress virgin hair and bleached and dyed hair; to advise the proper type of shampoo for each condition of the hair; to give all kinds of shampoos and rinses; to cleanse and dress extra hair pieces; to care for tools; and to keep all equipment in working order.

A shampoo is a preparatory process for nearly all work done on the hair. The outer layer of the hair shaft, the cuticle, must be perfectly clean in order that the pigment in the under layers may show through and that the shaft may be able to reflect the light. Usually a successful permanent wave or hair tint cannot be given unless the hair has been properly shampooed; a finger wave can be set more quickly and will be more lasting after a shampoo; and only clean hair can be successfully iron-curled.

A good shampoo will leave healthy hair soft, elastic, and lustrous, while a poor shampoo may leave it dry, dull, and stubborn to work with, and may cause uneven coloring and streaks in dyed hair. A careless shampoo may account for the failure of a hair tint or of a permanent wave.

Frequent shampooing cannot harm the hair if soft water is used with a mild soap which does not cover the hair shaft with a deposit that will not be dissolved by ordinary rinsing. Frequent shampooing may be beneficial to dry hair, as the sebaceous glands will be stimulated to excrete more oil.

The frequency of the shampoo depends upon:

1. The health of the patron.
2. The condition of the scalp and hair. An oily scalp needs cleansing more often than a dry one.
3. The patron's environment and occupation.
4. The tendency of the hair to retain a wave, and the type of wave given.

Rules and Precautions

1. Wash your hands before and after every shampoo. Use sterile combs, brushes, and towels, and use a freshly sterilized comb on the clean hair after the shampoo.

2. Keep the shampoo bowl and tray clean; keep tools and materials dry; adjust the chair properly; see that your uniform and the chair cloth and rubber cape are spotlessly clean.

3. Your fingernails should not be so long and pointed that they will scratch the patron's scalp and possibly cause an infection.

4. Protect the patron's clothing and face; do not spill water on the floor.

5. Do not apply the water too hot. Test for temperature by turning the spray on your own wrist.

6. Keep two fingers under the spray; hold it firmly; apply the spray close to the head; rinse out every trace of soap.

7. The hair may be wet before the soap is applied. Never use bar soap. Apply the soap, in liquid form, gradually to the hair and scalp. Give two or three soapings.

8. When a hot oil shampoo has been given, apply warm soap to the hair before wetting it with the spray.

9. Use the cushions of the fingers for lathering and manipulating. Movements should be rhythmical and give enough pressure to increase the flow of blood to the scalp tissues.

10. Hair, wet or dry, must be handled lightly. It is a strain on hair to brush or comb it while it is very wet.

11. Give special attention to cleansing the hairline where cream and powder may be adhering to the hair.

12. A cleansing lotion may be applied at the beginning of the shampoo, before the hair is wet, to free the scalp of scales and dirt.

13. Read and follow directions when using a commercial shampoo product.

14. Apply a tonic *after* the scalp and hair have been cleansed.

15. Always shampoo dyed hair with mild soap and soft water.

16. Shampoo bleached hair carefully. Use tepid water in the rinsing; hot water may cause bleached hair to mat and break. Apply the soap gradually and spread it gently. A hand dry may be given.

17. Before shampooing snarled and matted hair, apply oil with a sterile cotton pledget, separate the hair into small strands, and comb gently, beginning at the ends. Use a comb with wide teeth.

18. To remove salves and pomades, apply the soap before the hair is wet in order to dissolve the pomade before the soap has been diluted with water.

19. Be sure that the patron is comfortably seated under the dryer and that the air is of the proper temperature. Do not allow the hot air to burn her face, neck, or ears.

20. Give a hand dry to a patron who objects to the heat of the electric dryer. Give a hand dry to fragile, oversteamed, and overbleached hair.

21. To give a hand dry, rub strands of hair between folds of a thick towel; complete by brushing with an upward stroke.

22. Never use the hot air of an electric dryer after a liquid dry (flammable) shampoo.

23. Give a cold water rinse to stimulate the scalp and prevent matting of the hair.

24. A shampoo brush may be used to stimulate the scalp, remove dandruff, and remove make-up around the hairline. An ordinary hair brush may be used for this.

25. Extra hair pieces without foundation, such as switches, should be shampooed with soap or drycleaning fluid. Swish the hair piece from side to side, never with an up-and-down movement, comb carefully, and dry.

26. Transformations and toupees should be immersed in drycleaning fluid, dried, aired, and placed on a block. The hair may then be waved.

Brushing the Hair

A thorough brushing of the hair should precede every shampoo, unless the hair has been injured by overbleaching or oversteaming. The brushing should stimulate the circulation of blood to the scalp, loosen and remove scales of dandruff and particles of dust, and distribute the natural oil of the scalp to the tips of the hair, making it soft and elastic.

Hair should never be brushed before the strands are loosened with the comb. The hair should be divided into sections and combed lightly, beginning at the ends.

For short hair, a firm upward stroke with the brush should be used. Long, thick hair should be brushed strand by strand. Wet hair must be handled gently, especially if snarled and matted.

A PLAIN SOAP SHAMPOO

Supplies.¹

Towels	Chair cloth
Neck strip	Rubber cape
Comb and brush	Shampoo soap

¹Supplies that come in direct contact with the patron in this and every other manipulative procedure must be sterile.

Preparing the patron.

1. Wash your hands.
2. Seat the patron; place neck strip, chair cloth, and rubber cape.
3. Remove hairpins and examine the scalp.
4. Part the hair, comb free of tangles, and brush with an upward and outward stroke.
5. Massage back of neck to relax the patron.

Giving the shampoo.

1. Lower the patron's head to the bowl.
2. Adjust the temperature of the spray; turn the cold water on first; keep two fingers under the spray.
3. Wet the hair with warm water. Apply the spray close to the head.
4. Apply warm liquid soap and work the lather over the head with the fingertips of both hands.
5. Rinse.
6. Repeat both soaping and rinse three times.
7. Give a final cold water rinse if desired.
8. Give an acid or other rinse at this point if desired.

Completing the shampoo.

1. Raise the patron's head, place a towel over it, pat out excess water, and give neck manipulations.
2. Return her to the chair and dress her hair.

Clean up.

1. Rinse the shampoo bowl with hot water.
2. Put away supplies; put used towels in covered container.
3. Sterilize instruments and place in cabinet sterilizer.
4. Clean, dry, and fold rubber cape and chair cloth, and place in a dust-proof container.
5. Wash your hands.

HOT OIL SHAMPOO

A hot oil shampoo may be used for normally healthy hair, for dry scalp and hair, for bleached and dyed hair, and for hair

that has been exposed to salt water and strong sunlight. Its purpose is to soften scales of dandruff, supply oil to the hair, and keep it in good condition before and after a permanent wave.

Supplies.

As for a plain soap shampoo.

Add bowl for oil, cotton pledgets, and steamer.

Preparing the patron.

As for a plain soap shampoo.

Giving the shampoo.

1. Part the hair in $\frac{1}{4}$ -inch partings and apply the oil to the scalp with a cotton pledget.
2. Work the oil over the scalp with firm manipulations. Comb the oil through to the ends of the hair.
3. Place the patron under the steamer and steam the hair for 10 or 15 minutes. In the absence of a steamer, apply turkish towels dipped in hot water: wring them partly dry and wrap around the patron's head. Do not allow the hot towel to touch the patron's skin around the face and ears.
4. Take the patron to the bowl and proceed with a warm soap shampoo.

Clean up.

As for a plain soap shampoo.

EGG SHAMPOO (LIQUID)

An **egg shampoo** is given usually to dry, fragile, bleached, or oversteamed hair because of its mild action. It is also used for naturally sensitive scalps that may become irritated by the application of any soap. Bleached hair has a tendency, when wet, to tangle and break. An egg shampoo will cleanse the hair without removing all the natural oil from it. When used on an oily scalp, soap should be used to cut the oil, the hair rinsed, and the egg mixture applied. An egg shampoo will

leave hair soft and fluffy and bring out its high lights. The number of eggs used depends upon the thickness of the hair.

Supplies.

As for a soap shampoo, substituting for soap two or three eggs, the yolks and whites beaten separately and folded together.

Preparing the patron.

As for a soap shampoo.

Giving the shampoo.

1. Wet the hair.
2. Apply half of the egg mixture. Work it over the scalp and hair.
3. Rinse with warm water. Hot water will curdle the egg.
4. Apply the remainder of the egg.
5. Give a final rinse of cold water.

Complete and clean up.

As for a soap shampoo.

EGG SHAMPOO (DRY)

Supplies.

As for a soap shampoo, substituting for soap one egg beaten with one teaspoonful each of salt and witch hazel.

Add sterile gauze and cotton pledgets.

Preparing the patron.

As for a soap shampoo.

Giving the shampoo.

1. Part the hair and apply the egg with cotton pledgets.
2. Give scalp and neck manipulations.
3. Place the patron under a therapeutic light for a few minutes.
4. Cover a brush with gauze and brush out the dry egg. Change the gauze when it appears soiled.

5. Rub the hair gently with dry towels.
6. A scalp lotion may be applied.
7. Dress the hair.

Clean up.

As for a soap shampoo.

LIQUID TAR SHAMPOO

Tar shampoos are given for oily scalp and hair. They are not recommended for blonde or gray hair.

Supplies.

As for a soap shampoo, substituting liquid tar mixture for soap.

Preparing the patron.

As for a soap shampoo.

Giving the shampoo.

1. Lower the patron's head to the bowl.
2. Adjust the temperature of the spray.
3. Wet the hair with warm water.
4. Part the hair and apply liquid tar mixture.
5. Rinse well with warm water.
6. Repeat both tar application and rinse three times.
7. Turn off water; hot water first.

Complete and clean up.

As for a soap shampoo.

TAR JELLY SHAMPOO

Supplies.

As for a soap shampoo, substituting tar jelly for soap.
Add: spatula.

Preparing the patron.

1. As for a soap shampoo.
2. Part the hair in $\frac{1}{2}$ -inch partings; remove tar jelly from

the jar with a spatula and apply to the scalp with the fingertips.

3. Take the patron to the shampoo bowl.

Giving the shampoo.

1. Lower the patron's head to the bowl.
2. Wet the hair.
3. Work the lather over the head with the fingertips of both hands.
4. Remove the tar jelly by a thorough rinsing with warm water.

Complete and clean up.

As for a soap shampoo.

Dry Shampoos

Dry shampoos, liquid and powder, are given when, for some good reason, a wet shampoo is not advisable. A dry shampoo saves time, as it does not take out the wave. The shampoo may be followed by an application of a lotion or a pomade.

For a **liquid dry shampoo**, an agent especially prepared for the purpose is used. These preparations are usually inflammable, and the directions on the container should be carefully followed. The following **precautions** must be observed:

1. The room must be well ventilated.
2. There should be no fire or any flame of any kind in the room.
3. No rubbing, brushing, or manipulations should be used.
4. The shampoo must have completely evaporated before the hair can be iron-curved.

A **powder dry shampoo** is given to oily scalp and hair, or to normal hair, when because of some physical condition a wet shampoo would endanger the patron's health. The oil and dirt are absorbed by the powder and brushed out with it. Corn meal, almond meal, bran, or orris root is used. The amount of powder applied depends upon the oiliness and thickness of the hair. Several applications may be required to absorb all of the oil and dirt.

LIQUID DRY SHAMPOO**Supplies.**

Towels and cotton pledgets	Bowl and cup
Chair cloth and rubber cape	Comb
Neck strip	The shampoo liquid

Preparing the patron.

As for a plain soap shampoo.

Giving the shampoo.

1. Lower the patron's head to the bowl.
2. Place a towel over the patron's eyes. Protect her ears with cotton.
3. Lift the hair and pour the liquid (about one cupful) slowly through the hair. Repeat if necessary.
4. Gently squeeze out excess liquid.

Completing the shampoo.

1. Raise the patron's head from the bowl.
2. Place a towel over her head and pat out the excess liquid.
3. In a well-ventilated booth, fan the hair to aid in the evaporation of the liquid. The cold air of the dryer may be used.
4. A tonic may be applied.
5. Push the wave into place.

Clean up.

As for a soap shampoo.

POWDER DRY SHAMPOO**Supplies.**

As for a soap shampoo, substituting powder in a shaker for soap.

Add gauze, cotton pledgets, and tonic.

Preparing the patron.

As for a soap shampoo. Place cotton in the patron's ears.

Giving the shampoo.

1. Part the hair in $\frac{1}{4}$ -inch partings.
2. Shake the powder into the partings and work it into the scalp with the fingertips.
3. With a gauze-covered brush remove the powder from the hair. Change the gauze when it becomes soiled. Continue until the hair is clean.
4. Apply a tonic to the scalp with a cotton pledget.
5. Dress the hair.

Clean up.

As for a soap shampoo.

Soapless Shampoos

Soapless oil shampoo products have an oil base which is soluble in water. Soap is not required to remove the oil.

A soapless oil shampoo is given in the same manner as a plain soap shampoo unless different instructions are furnished by the manufacturer.

Special Shampoos

There are a number of shampoo preparations advertised and recommended for certain conditions of the hair and scalp. They should be used according to the instructions of the manufacturer and for the conditions specified.

Shampoo Soaps ²

A good shampoo preparation and soft water are the two elements necessary for a successful shampoo. A shampoo product of a well-known manufacturer should always be used. It should not contain more alkali than is necessary to remove the dirt, oil, and scales on the scalp and hair.

Soaps that are harsh and strong in action are not necessary for the removal of dandruff and oil. Several soapings with a mild preparation will accomplish the purpose of cleansing the hair and scalp. Soaps that lather freely are not necessarily

² Soaps are discussed in Chapter XII, "Chemistry in Cosmetology."

highly cleansing agents. Free alkali may be present in excess; its continued use will dry the hair and irritate the scalp. The small bubbles of a mild soap have a greater cleansing power than the larger bubbles of a high-lathering soap for the reason that they cover the surface of the hair shaft more completely.

A good shampoo soap will have the following advantages:

1. Be mild in action.
2. Accomplish the shampooing quickly.
3. Remove dirt, oil, and dandruff.
4. Be easily rinsed away.
5. Make acid rinses unnecessary.
6. Leave the scalp free from scales, and the hair with its natural gloss and in perfect condition for a wave or tint.

A poor shampoo soap (one containing an excess of alkali) may produce the following effects:

1. Irritate the scalp tissues.
2. Slow down the shampooing process.
3. Leave a deposit on the scalp and hair.
4. Yellow white or silver-gray hair.
5. Remove too much of the natural oil, dulling the hair and reducing its degree of elasticity. After several poor shampoos the hair may become dry and brittle and break off.
6. Change the shade of a hair tint or bleach.

Acid and Coloring Rinses

Rinses are fluids other than water that are used after the final water rinse to remove any soap film left on the hair and to heighten or darken its appearance. A vegetable rinse will not permanently color the hair, but it will color gray hairs slightly so that they will be less noticeable among the darker hairs. The rinse should not be poured carelessly over the hair, but applied evenly and carefully. To give a rinse properly requires skill and experience.

Acid Rinses

The principal acid rinses are vinegar and lemon. They are used to remove oil or soap film, to soften the hair, and to

bring out its high lights. An acid rinse should never be given before a permanent wave.

VINEGAR RINSE

1. Dilute one-fourth cup of vinegar with one pint of warm water.
2. Apply slowly to the hair after a shampoo.
3. Rinse with clear water.

LEMON RINSE (FOR LIGHT HAIR)

1. Add the juice of one lemon to one pint of warm water, and strain through a cloth.
2. Pour over the hair after a shampoo.
3. Rinse with clear water. None of the lemon juice should be left on the hair.

Coloring Rinses

BLUING RINSE

Given to remove a yellow cast and streaks from white hair and gray hair, and to tone down hennaed hair. A bluing rinse may also be used on black hair to give it a blue-black appearance. Tepid water should be used; hot water will yellow white hair.

1. Add a few drops of bluing to a quart of tepid water. The solution should be stronger for gray than for silver-white hair.
2. Apply as a final rinse after a shampoo. A brush may be used to spread the solution over the hair.

CAMOMILE RINSE

Given to naturally light hair that has become faded and dulled. More than one application is usually necessary to bring out the high lights of the hair.

1. Steep two tablespoonfuls of dried camomile leaves in a pint of hot water. Strain through a cloth and dilute with cool water.
2. Apply after a shampoo as a final rinse.

HENNA RINSE

Given to produce a slight auburn tint in drab or blonde hair. Frequent applications will produce a deeper shade. Applied in this manner, henna makes very little impression on dark hair.

1. Simmer two tablespoonfuls of henna leaves in one pint of water. Strain through a cloth.
2. Rinse through the hair three or four times. It may or may not be left on until the next shampoo. •

Commercial Rinses

These are products of the brightening and platinum rinse type, and should be used according to the instructions of the manufacturer. A brightening rinse is given to drab and faded hair; a platinum rinse to bleached hair and snow-white hair. If the hair is to be iron-curled, it should be rinsed but slightly, as the heat of the iron may produce an uneven shade.

PEROXIDE RINSE

Mix equal parts of hydrogen peroxide and warm water. Pour over the hair as a final rinse after a shampoo.

Questions

1. What is the principal purpose of a shampoo?
2. How does the exercise of the scalp muscle during a shampoo affect scalp tissues?
3. What should an operator know in order to be able to give a proper shampoo?
4. What abilities should an operator possess in order to shampoo hair correctly?
5. Give some reasons why a shampoo should be properly performed.
6. Why should the cuticle of the hair shaft be kept clean?
7. In what condition will a good shampoo leave the hair?
8. What will be the effects of a poor shampoo?
9. Does frequent shampooing harm the hair?

10. Upon what factors does the frequency of shampooing depend?
11. Why does oily hair need cleansing oftener than dry hair?
12. How may dry hair be benefited by frequent shampoos?
13. What is the first rule to follow when giving a shampoo?
14. Why should all articles used in shampooing be sterilized?
15. Why should the operator's fingernails be reasonably short?
16. How should the test for temperature of the spray be made?
17. How should the spray be held?
18. Should the hair be wet before the soap is applied?
19. How should shampoo soap be applied to the hair?
20. Should the soap be applied warm or cold?
21. Why should hair be handled gently while wet?
22. Why should the hairline be given special attention during a shampoo?
23. Should a tonic be applied before or after the scalp has been cleansed?
24. How should dyed hair be shampooed?
25. What precautions should be taken when shampooing bleached hair?
26. How should snarled and matted hair be treated before a shampoo?
27. How should salves and pomades be removed before shampooing the hair?
28. When is a hand dry advisable?
29. How is a hand dry given?
30. For what purpose is a cold water rinse given?
31. How should extra hair pieces be shampooed?
32. How may transformations and toupees be cleansed?
33. What are the beneficial results from brushing the hair before a shampoo?
34. How should hair be brushed?
35. What supplies are used in giving a plain soap shampoo?
36. How should a patron be prepared for a shampoo?

37. How should a patron be protected during a shampoo?
38. Describe the process of a plain soap shampoo.
39. Why are neck manipulations given before a shampoo?
40. Describe the clean-up process after a shampoo.
41. Should hot oil shampoos be given to all types of hair?
42. For what conditions of the scalp and hair are hot oil shampoos advised?
43. What are the purposes of a hot oil shampoo?
44. Describe the process of a hot oil shampoo.
45. When would you recommend an egg shampoo?
46. Why is an egg shampoo advised for bleached hair?
47. What is the effect of an egg shampoo?
48. Describe the process of a liquid egg shampoo.
49. How is a dry egg shampoo given?
50. How should an egg shampoo be given to oily hair?
51. Why should hot water not be used in an egg shampoo?
52. For what condition of hair and scalp is a tar shampoo advised?
53. Describe the process of a liquid tar shampoo.
54. How would you give a tar jelly shampoo?
55. Under what circumstances is a dry shampoo advised?
56. Name two kinds of dry shampoos.
57. Will a dry shampoo remove the wave from the hair?
58. What precautions should be observed in giving a liquid dry shampoo?
59. Should an iron curl be given immediately after a liquid dry shampoo?
60. How should the hair be dried after a liquid dry shampoo?
61. Why should the hot air of the dryer not be used after a liquid dry shampoo?
62. Describe the process of a liquid dry shampoo.
63. What is meant by a powder dry shampoo?
64. When should a powder dry shampoo be advised?

65. Name some of the bases used in a powder dry shampoo.
66. Describe the process of a powder dry shampoo.
67. What is a soapless oil shampoo?
68. What are special shampoos?
69. What are the two elements necessary for a successful shampoo?
70. Are strong shampoo soaps necessary to remove oil and dirt?
71. Give some of the qualities of a good shampoo soap.
72. What are some of the disadvantages of a poor shampoo soap?
73. How do strong soaps affect the hair shaft and scalp tissues?
74. What are rinses, and for what purposes are they given?
75. Will a vegetable rinse permanently color the hair?
76. Name two acid rinses and give their action on the hair.
77. How is a vinegar rinse given?
78. For what type of hair is a lemon rinse used?
79. How is a lemon rinse given?
80. What is the purpose of a bluing rinse? How is it given?
81. How is a camomile rinse prepared, and for what purpose is it given?
82. Describe the process of a henna rinse.
83. What shade does a henna rinse impart to the hair?
84. What is a brightening rinse? For what types of hair is it given?
85. When is a platinum rinse given?
86. How is a peroxide rinse given to the hair?

Chapter XVI

HAIRDRESSING

Hairdressing is the art of waving, curling, combing, and arranging the hair. An "individual coiffure" is one in which waves and curls of the prevailing mode are arranged to emphasize the good points and minimize the defects of a patron's features and headline.

Becomingness is the most important consideration in dressing the hair. The contour of the head should be carefully noted, the full view, back view, and profile considered, and the width of the eyebrows, the nose, and other features studied with the balancing of the hairdress in view.

To give a becoming hairdress in a modern style, an operator should have a **knowledge** of: hair texture and all abnormal conditions of the scalp and hair; effects of hot irons, steam, and wax on hair of all textures and on virgin hair, white hair, bleached hair, and dyed hair; composition and effects of oils and waving fluids on hair; effect of colored lotions on white hair; all types of heating irons and their size, weight, balance, shape, and heating qualities; and the time required to heat irons for waving and curling hair of all textures.

An operator should have the **ability**: to observe all safety precautions while dressing the hair; to wave and curl straight hair, naturally curly hair, and permanently waved hair, using water or waving fluid, by means of the fingers, a brush, hair-pins, curlers, or waving combs, in any method, such as finger waving, brush curling, pin curling, sculpture curling, comb waving, and others; to wave and curl straight hair, using any type of curling iron, by the methods known as bob curling, round curling, paper curling, marcel waving, and others; to temper, oil, and care for heating irons; to judge iron heat

expertly; to dry wet waves properly; and to comb out waves and curls and dress the hair both for daytime and evening in a modern hairstyle.

An important factor in waving and curling is the degree of resilience of the hair. Besides the classifications given in Chapter IX, "The Hair and Nails," hair is also called "hard" and "soft." Hard, resilient hair of any texture is easy to wave, while limp hair of any texture presents difficulties: usually it will not retain a wave.

• The methods used in the shop for creating a foundation for a hairdress, other than permanent waving, are called *wet waving* and *iron curling*.

Wet Waving

The principal methods of waving hair while wet are known as *finger waving*, *brush curling*, *pin curling*, *sculpture curling*, *comb waving*, and *push waving*.

Finger Waving

A **finger wave** is a wave placed in the hair with the fingers and comb, with the use of water or a waving fluid. The waves are set to follow the shape of the letter S, a net is placed over the head, and the hair is dried and then combed out and dressed. The ends of the hair may be arranged in ringlets, puffs, or rolls, according to the style of hairdress desired. Naturally curly and permanently waved hair may easily be finger waved; straight hair will not usually retain a finger wave.

The test of a finger wave is its lasting quality, which depends upon:

1. Waving the hair to conform to the way the patron combs it, in order that she will not, through habit, disarrange and spoil the wave when she combs it herself, and as a result blame the operator for giving her a wave that does not last. In most instances, this means that the wave should be molded to the head in the direction of the natural slant of the hair follicles in the scalp. A wave in which the hair, or a part of the hair, is molded in an unnatural slant is often given to

satisfy the demands of a patron. The operator should explain to the patron that such a wave cannot be as lasting as one which will conform to the natural slant of her hair.

2. Stretching and combing the hair between even, well-defined ridges. A wave will not last unless the hair has been stretched and combed into position.

3. Waving through to the scalp in the same direction and position.

Pinching the waves after placing the net will strengthen the ridges. The width of the wave will depend upon the texture of the hair and the effect desired.

Waving fluids are used to make the hair pliable and to hold the wave in place while the hair dries. The hair should never be dripping wet with water or lotion. To apply a lotion, part the hair and apply the liquid close to the scalp, using the comb to distribute the lotion through the hair.

Before the patron leaves the shop, the finger wave should be combed out well and brushed and the hair dressed as it is to be worn.

FINGER WAVING

Supplies.¹

Towels and neck strip	Hairpins and net
Rubber cape	Finger waving lotion
Finger wave comb	Brilliantine
Dress (tail) comb	

Preparing the patron.

1. Place towel and cape.
2. Wet the hair with water.
3. Part and comb the hair and apply finger waving lotion.

Giving the finger wave.

1. Comb the hair to the angle of the desired hairdress.
2. Place index finger where wave is to form.
3. Comb hair into teeth of comb.

¹ Supplies that come in direct contact with the patron in this and every other manipulative procedure must be sterile.

4. Shape the hair from one-half to three-quarters of an inch in the desired direction.
5. Place the middle finger back of the ridge, the index finger in front of the ridge, hold firmly, and comb down to the ends of the hair.
6. Press the ridge between the middle fingers and lift the index finger.
7. Place the teeth of the comb under the ridge, lower the index finger in front of the ridge, and comb in the direction in which the next wave is to be shaped.
8. Repeat until the hair is combed smooth and molded to the head.
9. Continue to form waves until center back is reached.
10. Two waves may be set in this manner on the heavy side of the hair; then proceed to the other side.
11. Join wave at center back; and continue until all the hair is waved.
12. Finish the ends with pin or sculpture curls.

Completing the wave.

1. Place a net over the hair.
2. Press the waves.
3. Protect the forehead and ears with a neck strip, and seat the patron under the dryer.
4. When the hair is thoroughly dry, comb and brush the wave and dress the hair. Apply brilliantine if desired.

Clean up.

1. Put away supplies.
2. Sterilize equipment and place in the cabinet sterilizer.

Brush Curling

A brush curl is given after a shampoo when the hair is still wet, or after saturating strands of hair with water. The hair is usually sectioned in one-half to one-inch squares. Brush the wet strands tightly around the tip of the index finger, spreading the hair evenly in an overlapping curl. Keep the

hair from spreading at the scalp by turning the hair in the hand before the wrap is made around the finger (this forms a twist or a button). Pin securely the curl with hairpins and slip the curl from the finger. The success of a brush curl depends upon the care in sectioning, the tightness and smoothness of the winding and brushing, the proper twist of the hair at the scalp, and the insertion of the hairpins. The brush should be kept wet by dipping it frequently into water. This method is used for naturally curly and permanently waved hair, and is usually given to very fine hair to produce a fluffy wave with ringlet ends.

Pin Curling

Pin curls are flat curls formed in wet hair and held in place with hairpins until dry. A pin curl is formed by wrapping a moistened strand of hair around the index finger. The curl is pinned into place and the hair dried. This method is used for naturally curly and permanently waved hair. If pin curls are to be made over the entire head, section or block the hair into about one-fourth-inch squares.

Sculpture Curling

A **sculpture curl** is a short ringlet which lies close to the head. Sculpture curls are used for elaborate effects in hair styling and also when flat curls are desired. The difference between a sculpture curl and a pin curl is in the method of wrapping. A sculpture curl is wrapped from the end of the hair to the scalp, with the end of the strand inside. Sculpture curls may be made to produce a large curl or a tight curl by using a large or small opening when starting the curl.

Comb Waving

A **comb wave** is given to naturally curly or permanently waved hair to create a fluffy effect. It is produced by inserting combs teeth upward in the moistened hair, pushing the hair into even waves, covering with a net, and allowing the hair to dry. The waving combs may be had in a variety of sizes and shapes to fit the various shapes of head. Hard

rubber combs should be used. Inflammable celluloid combs should never be placed under an electric dryer.

Push Wave

A **push wave** is given to naturally curly or permanently waved hair when a finger wave is not desired. The hair is moistened and combed smooth. Starting at the bottom, the waves are then pushed into shape, dried, and loosened with the comb.

Rules and Precautions for Wet Waving

1. Protect the patron from water and lotions; protect her ears and neck when under the hot air of the dryer.

2. Keep hairpins in the cabinet sterilizer; dry combs and brushes well before placing them in the cabinet sterilizer; hang the rubber cape up to dry; then fold it and place it in a dustproof container.

3. Give a shampoo if the hair is oily or dirty; clean hair will retain a wave longer in most cases.

4. Place hairpins with care. Do not tangle or pull the hair; do not irritate the scalp with hairpins, comb, or sharp fingernails.

5. Do not use an excess of waving fluid; keep the part in the hair free from waving fluid.

6. The teeth of the comb should always slant upward when a wave is being formed.

7. Adjust the dryer to the proper temperature for the comfort and safety of the patron.

8. Turn off dryers when not in use; follow the manufacturer's instructions on the care of the dryers.

9. Advise scalp massage and reconditioning treatments for the patron's hair and scalp when necessary.

10. When white hair is being dried, very moderate heat should be used and care should be taken that the dryer is not placed too close to the head.

11. Use standard supplies; a good waving lotion will leave no deposit on the hair shaft.

12. If the hair has been thoroughly dried before dressing it, combing will not weaken the wave. Combing and brushing should give a soft, natural effect with no stiff, set ridges.

Iron Curling

The principal methods used for curling the hair with heated irons are: *paper curling*, *bob curling*, *round curling*, *poker curling* and *marcel waving*.

Special precautions should be taken when using hot irons on hair. Too hot an iron will:

1. Injure the hair.
2. Discolor white and gray hair.
3. Produce a fuzzy wave in fine hair.
4. During marcelling, cause wiry hair to buckle.

Paper Curling

A paper curl, usually called a French paper curl, is given to fine hair which, because of its lack of "body," will not take a successful wave by other methods. A paper curl gives a more lasting curl to hair that is difficult to wave; it is seldom used on coarse hair. It is given by winding strands of hair around a paper-curl stick, covering each curl with a triangular-shaped paper, and pressing the curl with a hot paper-curl iron. When cool, the papers are removed and the hair is combed and set into waves or ringlets.

The hair may be blocked in triangles or squares. The type of blocking, the size of the blocking, and the starting point should be governed by the style of hairdress desired. The two methods of winding are *spiral* and *croquignole*.

Timing the heat is important. It is usually done by counting, according to the method of instruction, the count ranging from 5 to 35 counts. A test should be made on two curls with different timing. Precaution should be taken not to use too hot an iron, which will make gray or white hair turn amber, or yellow. Too much heat will also distort the shape of the wave. When pressing the curl, the comb should be kept between the iron and the scalp.

PAPER CURLING**Supplies.**

Chair cloth	Stick—small, medium, or large
Neck strip	Paper—waxed or parchment
Comb	Testing paper
Paper-curl iron	

Preparing the patron.

1. Place chair cloth and neck strip.
2. Examine the hair. If it is dry and brittle and the ends have been permanently waved, apply brilliantine sparingly.

Giving the paper curl.

1. Block in one-half to one-inch squares or triangles.
2. Place the end of the hair in correct position on the stick; wind evenly, smoothly, tightly, and close to the scalp. The croquignole and spiral methods of winding may be combined.
3. Remove the hair from the stick; place it in the paper.
4. Fold the paper over the curl. Twist the end to hold the paper in place. *Precaution:* the paper must completely cover the curl; it must be tight at the bottom to hold the hair in place.
5. Test the iron; then press the papers with the iron, timing according to the texture of hair and the curl desired.
6. Cool and remove papers.
7. Brush and comb the hair well.
8. Place the wave by dry finger waving, by push wave, or by placing the waves under a net.
9. Roll the ends into curls over the fingers or a bob-curl iron, paper-curl stick, or tail comb.

Clean up.

1. Put away supplies.
2. Place used papers in waste container.
3. Fold chair cloth and put away.

Bob Curling

A **bob curl** is a hairdress given to create a fluffy effect. Bob curls are also used as a finish for the ends of hair. To give a bob curl, block the hair in sections from 2 to 2½ inches, depending upon the texture of the hair and the curl desired. Clasp the strand about one inch from the end with a bob-curl iron or marcel iron and roll toward the scalp. Click and roll the iron at the same time, until the ends of the hair are free or until the iron may be rolled in the curl without opening the iron. This will prevent fish-hook ends. With the thumb and two first fingers, tighten the hair on the iron and roll up, placing the comb between the iron and the scalp.

Round Curling

Round curls are usually given to long, fine hair. The soft, fluffy waves and curls are becoming to thin faces and create much the same effect as paper and brush curls. Block the hair in even squares (usually one-half inch), and wind around the heated rod of the marcel iron with a flat wrap or full twist. Hold the iron parallel to the part, with the prong to the head. Close the iron lightly, and with the comb between the iron and the scalp, hold until the heat penetrates the hair. The size of the wave depends upon the blocking and the size of the iron used. The flat wrap will produce soft waves; the full twist will give a fluffy effect. Comb each curl separately; then blend them together and set the waves.

Poker Curling

Poker curls are hanging curls. Insert the iron as far up the strand as desired for the type of curl, and wrap a strand of hair around the iron. Rotate the iron until all the hair has passed between the prong and rod.

French Marcel Waving

A **marcel wave** is given with a marcel iron and is made by shaping the hair with the marcel comb and pressing the hair with a heated iron into even and regular waves. A knowledge

of hair form and texture will enable the operator to decide the size of the wave, the style of parting the hair, the amount of heat required for the hair texture, and the proper method of waving the patron's hair.

Rules for Marcel Waving

1. Never use the iron before testing it.
2. The shell of the iron is always toward you when starting a wave.
3. Always pick up the hair on the top of the ridge.
4. Keep the iron closed while gliding.
5. Release the comb while the iron is closed.
6. Waves are dropped to make a smooth blending at the back of the head, or to give a swirl effect.
7. The wrist should be relaxed; manipulate the iron with the fingers.
8. Learn the proper position of the iron to make dips at the front hairline.
9. Do not give too strong a wave to the crown, unless the hair is unusually thick there.
10. The finished wave must lie close to the head; keep the hair close to the head while marcelling it.
11. "Clicking" the iron will enable you to use a hotter iron without injuring the hair, and will spread the hair on the iron.
12. Bumpy waves are caused by losing control of the hair, picking up too much hair or picking up the hair too near the scalp, sliding beyond the ridge, and sliding with the bowl toward you.
13. Waves will not match if too much hair is picked up, or if the iron does not slide the same distance between waves on each section of hair.
14. Keep the hair under control by combing it over the bowl of the iron until the comb holds all the hair of the strand.
15. The point of the iron should be kept clear of the hair to prevent making an irregular wave.
16. Do not turn the wrist when giving the iron either an upward or downward turn: roll the iron with the fingers.

17. Do not close the iron until the hair has first been shaped with the comb.
18. A *shadow wave* is made by outlining lightly.
19. By a *retrace* is meant the retracing of the waves of the entire head.
20. After marcelling, apply brilliantine with an atomizer.

FRENCH MARCEL WAVE

Supplies.

Chair cloth and neck strip	Marcel comb
Testing paper	Marcel iron
	Marcel stove—gas or electric

Preparing the patron.

Place neck strip and chair cloth.

Giving the marcel.

1. Part and comb the hair to the angle of the hairdress desired.
2. Pick up a thin layer of hair with the comb. Test the iron and insert it, with shell toward you, and shape the hair with the comb in the direction of the desired hairdress, and close the iron.
3. Roll the iron one-half turn away from you; keep the comb between the iron and the scalp.
4. Unroll one-half turn, open the iron wide, close the iron under the ridge, shell away from you.
5. With comb, shape hair in opposite direction for the next wave.
6. Roll the iron, shell toward you, and glide with closed iron; relax the hair.
7. Roll the iron one complete turn, then roll back to first position, iron on side, shell toward you.
8. Marcel to end of strand.
9. Connect strands by picking up a piece of waved hair with a piece of straight hair.

10. Pick up second wave and carry wave completely around the head.
11. Keep hair and iron close to head; protect the head from the iron with the comb.
12. To layer the sides, part off the top hair; pin loosely; leave enough waved hair for a pattern.
13. Deepen the back by picking up more hair in each wave.
14. Finish ends with bob curls, if desired.

Clean up.

1. Put away supplies.
2. Place used papers in waste container.
3. Fold chair cloth and put away.

Steam Marcel

A **steam marcel** is a marcel wave given to moistened hair to make a marcel more lasting when waving fine hair. The hair may be dampened before the marcel, or the marcel given, the top layer dampened by dipping the comb lightly in water, combing through the top layer, and marcelling with the iron until the hair is dry.

Croquignole Marcel

A **croquignole marcel** is one given by winding a complete strand of hair around an iron in a manner resembling a figure eight. Long or short hair can be waved by this method. A croquignole marcel is especially advised for a weak permanent wave, or for fragile, dyed, or bleached hair.

The hair is sectioned as for a croquignole permanent wave, and the strands combed and wound on a hot iron, from the scalp down, forming curls over the entire head. A special croquignole marcel iron is usually used for this type of wave.

The hair is brushed and then dressed by combing the waves into place.

Iron Waving Rules and Precautions

1. Be careful when using hot irons; do not burn the patron or yourself; protect the patron well.

2. Protect the patron's scalp when iron curling; when paper curling, see that the paper entirely covers the hair.

3. Do not use too-hot irons; heat yellows white and gray hair. Continued use of hot irons will affect the elasticity of hair and make it dry and brittle.

4. Hold the hair longer in a lukewarm iron after it has been rolled; this is safer than to use a hot iron for a short time.

5. Wave through the entire thickness of the strand.

6. To make waves lie close to the head, keep the hair close to the head while waving it.

7. Use wax sparingly. The hair will separate if too much wax is used.

8. Use irons for waving only.

9. Keep irons clean and free from rust; see that the joints are well oiled.

10. Test irons; do not overheat your iron; do not hold the iron too long in the hair; do not use too hot an iron.

11. Marcel irons may be cleaned with fine steel wool and a little oil, with fine sandpaper, or by wiping with a cloth while the iron is still warm.

12. To temper a marcel iron, heat it slowly to a dull, even red and insert it in a vessel of oil to cool.

13. Suggest scalp massage and hot oil treatments to patrons with dry and brittle hair.

Extra Hair Pieces

A hair piece may be any one of three general kinds:

1. A transformation, which covers the entire head.
2. A toupee, which covers the crown only.
3. A switch, which is without a foundation and is made of hair fastened into a stem at one end.

First-quality hair means "live" hair, or hair that has been cut directly from the head. It is the highest grade of hair and usually contains natural pigment. Combing are often sold for first-quality hair; close examination will show the deception. Combing are used for making hair pieces, and are prepared by hackling and rooting after the hair has been sterilized.

After a hair piece has been cleansed, for which instructions are given in Chapter XV, it can be dressed by mounting it on a block and waving the hair.

Questions

1. Define hairdressing.
2. What is meant by an "individual" coiffure?
3. What is the most important consideration in hairdressing?
4. Why should the contour of the head be studied before a hairdress is given?
5. What should an operator know in order to give a becoming and modern hairdress?
6. What abilities should she possess to wave and dress hair?
7. Is resilient hair harder to wave than limp hair?
8. By what other methods besides permanent waving is hair waved and curled?
9. What is wet waving?
10. What are the different methods for waving hair while wet?
11. Briefly describe the finger waving process.
12. What types of hair can be easily finger waved?
13. Upon what factors does the lasting quality of a finger wave depend?
14. In giving a finger wave, why should the hair be molded in the direction in which the hair follicles lie in the scalp?
15. For what purposes are waving fluids used?
16. How should a waving lotion be applied?
17. In finger waving, how should the comb be held?
18. How should a finger wave be treated before the patron leaves the shop?
19. Briefly describe the process of giving a brush curl.
20. For what type of hair is brush curling advised?
21. Upon what does the success of a brush curl depend?
22. What are pin curls?
23. How are pin curls formed?

24. For what types of hair is pin curling advised?
25. What is a sculpture curl?
26. What is the difference in winding between a pin curl and a sculpture curl?
27. For what effect is a comb wave given?
28. Describe the process of comb waving.
29. How are the combs inserted in the hair when a comb wave is being given?
30. What special precautions should be taken when using inflammable combs?
31. What is a push wave? When is it used?
32. How should the patron be protected when under the dryer?
33. Where should hairpins be kept when not in use?
34. Is it necessary to give a shampoo before wet-waving hair?
35. How should the comb be held when waving wet hair?
36. What precautions should be taken when drying white hair?
37. Why is it advisable to use a good waving fluid?
38. Will combing weaken a wet wave?
39. What are the principal methods used in iron-waving hair?
40. How should the scalp be protected from the hot iron?
41. Name four ways in which hot irons affect hair.
42. Does a hot iron affect the elasticity of hair?
43. Is a paper curl usually advised for thick, coarse hair?
44. Briefly describe the process of paper curling.
45. How is the hair blocked for paper curling?
46. What are the two methods used in wrapping a paper curl?
47. How is the proper degree of heat estimated for paper curling?
48. How should a paper-curl test be made?
49. What supplies are used for paper curling?
50. What is a bob curl? What effect does it create?
51. Describe the process of bob curling.
52. When are round curls given, and what effect do they create?

53. Describe the process of round curling.
54. What are poker curls? How are they made?
55. How is a marcel wave given?
56. Why is a knowledge of hair form and texture valuable in marcel waving?
57. Describe briefly the process of marcel waving?
58. Is the marcel iron manipulated by turning the wrist?
59. What are the advantages of clicking the iron?
60. How should the hair be held to make the wave lie close to the head?
61. Why are waves dropped in marcelling?
62. Should the comb be released while the iron is open or while it is closed?
63. How are bumpy waves caused?
64. Why do waves sometimes fail to match?
65. How may the hair be controlled while in the iron?
66. How is a shadow wave made?
67. What is meant by a retrace?
68. How should brilliantine be applied?
69. What is a steam marcel?
70. How is a croquignole marcel wave given?
71. For what kinds of hair is a croquignole marcel advised?
72. What is the effect of using too much wax?
73. How should a marcel iron be cleaned?
74. How should a marcel iron be tempered?
75. What is meant by "live" hair?
76. What is the difference between a transformation and a toupee?
77. How is a switch made?
78. How may extra hair pieces be waved?

Chapter XVII

PERMANENT WAVING

Permanent waving is the process of giving wave and curl to hair by changing the form of the hair shaft through the application of chemicals and heat. A permanent wave is given for the purpose of making a foundation for a becoming and modern hairdress.

To give a satisfactory permanent wave, an operator should have a knowledge of: sterilization and sanitation; the structure of hair and its degrees of elasticity and natural waviness; diseases and abnormal conditions of the scalp and hair; different permanent waving methods; different types of heaters; the effects of high temperature, steam, and chemical solutions on hair of all textures, dry and oily hair, bleached and dyed hair, and white and gray hair; the effect of humidity and dryness on the elasticity of hair; the different methods of blocking, wrapping, and winding; the effects of dyes, "color restorers," tonics, bleaches, and rinses on hair and the probable result of waving hair to which they have been applied; the effect of applying reconditioning oil to the hair before and after waving; and the different theories offered to explain the changes which take place in the hair shaft during the permanent waving process.

An operator should have the ability: to observe all safety precautions; to protect the patron from burns; to prepare a patron and give a permanent wave, using any standard machine or machineless process and any method of blocking, wrapping, winding, steaming, and cooling to naturally curly or straight hair, to hair of any length and texture, and to dyed, bleached, or white hair; to shape and thin hair to create a becoming and modish hairdress; to give, if necessary, a preliminary shampoo; to estimate the correct steaming time

needed to produce a strong wave in hair of any texture; to determine whether water or waving fluid should be used to complete the hairdress; to care for the hair after the wave; and to care for all supplies, tools, and equipment.

Permanent Waving Theories

A number of theories have been advanced in explanation of the changes that take place when hair is bent, stretched, and subjected to high temperature, steam, and alkali. Presumably, such a process involves some sort of internal reorganization of the cells of the hair shaft. The conclusions of Astbury, Woods, and other investigators are too lengthy to be discussed in this book. Their published works should be studied by every operator.

In the process of permanent waving, the cornified cells apparently become more or less confluent, so that the whole hair shaft acts as a *unit* which can be deformed in the same sense that wood can be steamed and made to assume a form to which it will return (like an archery bow). As nothing can reverse this action, the hair is said to have been given a "permanent set." Varying degrees of permanency may be obtained, according to the amount of extension of the hair, the strength of the chemical used, and the length of steaming time.

An answer to the question "*What makes straight hair stay curly after having been given a permanent wave?*" cannot yet be given to the satisfaction of any but a few chemists.

Texture and Elasticity of Hair

Accuracy in classifying hair as to texture and in estimating its degree of elasticity is necessary in order to decide correctly upon the method of waving to use. The waving process must be adjusted to the texture and condition of the hair. Some hair cannot be successfully waved. No two heads of hair are exactly alike; all hair does not possess the same degree of elasticity nor have the same hygroscopic quality (ability to absorb moisture).

By **hair texture** is meant the degree of coarseness or fineness of hair. For the purpose of permanent waving, hair is

classified as coarse, medium, fine, and very fine. The necessity to classify it further as oily and dry, harsh and soft, wiry and silky, and straight and curly is obvious.

Coarse hair is usually thick, and does not lie close to the head. Because of its peculiar cell structure, it requires less steaming time than fine hair, and it can easily be oversteamed. Coarse hair has more substance, and consequently is more directly and easily affected.

Fine hair might, perhaps, curl as easily as coarse hair, if each hair could stand out by itself; but, because it is fine, it will not do so, and it requires a longer steaming time than coarse hair. A permanent wave will give fine hair body and make it appear heavier. Opinions differ as to the best method for permanently waving fine hair.

Very fine or "cotton fine" hair presents problems, as hair of this texture will not often take a strong wave. All the details of the process should be given special attention: the size of the curling rod, the selection of the solution, and so forth.

Hair with some tendency toward curliness may appear straight because of its length and weight which pull out the wave. A **water test** for curliness may be made by moistening a strand with hot water and observing any degree of curliness or lack of it. Naturally curly hair will take a permanent wave more readily than straight hair. Larger sections should be blocked, larger rods used, and a shorter steaming time given than for straight hair of the same texture.

The elasticity of hair is one of the most important factors to be taken into consideration in permanent waving. In appearance, hair of normal elasticity will be resilient, alive, and lustrous, while hair which will not respond to normal extension will appear lifeless and limp.

When a patron's hair cannot be classified, or when a "problem" type confronts an operator, test curls made by different waving methods with different solutions and steaming time must be taken.

Permanent Waving Solutions

A **solution** is used to soften the hair and to supply moisture for making steam. The quantity of solution used depends upon the amount of moisture hair of the particular texture will absorb. The solution must be distributed evenly to each strand of hair and to the pad. An **insufficient** amount of solution may result in the hair's being subjected to dry heat of high temperature. An **excess** amount of solution on the strand or pad (more solution than the hair can absorb) may result in a scalp burn. Either insufficient or an excess amount of solution may be the cause of an unsuccessful permanent wave.

Some common **softening** agents used in solutions are: sodium sulphite, sodium carbonate, and ammonium carbonate. The solutions are classified by the manufacturer to conform to the various textures and elastic properties of the different types of hair.

Too strong solution will make hair over-absorbent; the hair will be harsh and brittle, and the wave kinky. **Too weak** solution will result in a limp wave that will not last, or in no wave at all.

Reconditioning the Hair

Reconditioning the hair before permanent waving usually consists in brushing and applying reconditioning oil, with or without the steamer, therapeutic light, and scalp massage. Many permanent waving failures are due to a dry condition of the hair. A series of reconditioning treatments should be advised for dry and brittle hair, bleached hair, and hair that has been tinted with any dye.

When a **dye remover** has been used, reconditioning treatments should never be omitted before giving a permanent wave. These treatments may also be given **after** a wave to soften the hair and keep it in good condition, and to prepare the hair for a new wave.

Cutting and Tapering the Hair

The hair is usually cut, shaped, and tapered before a wave is given, especially if it is coarse and heavy and requires much thinning. Ringlet-end failures are due to an attempt to curl ends that have not been sufficiently tapered before waving.

The hair should be cut **before** the shampoo. Unless it is unusually thin, the hair will need tapering to some extent. The common method is to cut the hair, thin it, and taper the ends. In croquignole waving the strands may be cut and tapered when the hair is in the blocks. Stubby ends are too heavy to form ringlets; but if the ends taper naturally, they need not be cut. A frizz instead of a curl will result if the ends are tapered to an extreme. Haircutting shears, thinning shears, or a razor may be used for tapering.

The Preliminary Shampoo

When giving a preliminary **shampoo**, a mild soap should be used and the rinsing should be thorough, as it is impossible to give a good wave to hair covered with soap film. Natural oil, dust, hair tonics, hair oils, and pomades interfere with the action of the permanent waving solution. When hair is over-dry and brittle, or has been bleached or dyed, it is not always advisable to give a shampoo before a wave. The hair should be dried before blocking; moisture on the hair will weaken the permanent waving solution. If the scalp is over-sensitive, the electric dryer should not be used because it is not wise to submit an irritated scalp to the waving process. Bleached hair may be shampooed a few days before a wave is given. It is not advisable to give an acid rinse before or after a permanent wave.

The Test Curl

Test curls are made to determine the reaction of the hair to the method of winding, length of steaming time, and strength of solution to use. The test is made by going through the entire waving process with two or three curls before waving all the hair. The test curls should be taken on the heavy

side of the part, in the most inconspicuous place, and where the hair would be in most danger of breaking.

Tests applied to dyed and bleached hair will show how much elasticity is left in the hair, and to what degree the hair will discolor or break off. Different results may be obtained on different textures of hair even when both textures have been colored by the same dye.

After cooling the hair, the test curl should be unwound and dipped into water and rubbed with a dry towel. A strong curl should result from the test, if the test is satisfactory.

Blocking the Hair

The hair is blocked in squares, or triangles and squares, for **spiral waving**. Triangular blocking is used around the crown to fit the wave to the curve of the head. For **croquignole waving**, rectangular blockings are made. In giving a combination wave, both spiral and croquignole blockings are used. Hair does not grow on the head with uniform thickness, and for this reason blocking is an important detail in the waving process. No one method of blocking is suited to every head because of the differences in size and contour of the skull. As nearly as possible, the same amount of hair should be taken for each block. Careless blocking will make irregular waves, and uneven sections are often the cause of pull burns and steam burns.

Too small sections may result in a kinky, oversteamed wave; **too large sections** make the hair bulky on the curling rod and will result in a weak wave which begins too far from the scalp. When blocking very thick hair, sections slightly smaller than average may be taken. Sometimes the failure of thick, coarse hair to take a strong wave is due to the blocking: the hair has not been divided into a sufficient number of curls. The number of sections depends upon the size of the head and the thickness of the hair.

Wrapping and Winding the Hair

The same method of wrapping and winding cannot be used for all hair. The methods used are **spiral** and **croquignole**.

By the spiral method, the hair is wrapped from the scalp to the ends; by the croquignole method the hair is wound from the ends to the scalp. By "wet wrap," in spiral wrapping, is meant that the hair is saturated with solution before it is wrapped. "Dry wrap" means that the hair is wrapped dry and the solution applied by means of a saturated pad, called also a *tamplet* or *sachet*. The wraps given are: flat wrap, full twist, half twist, and quarter twist.

Much practice is necessary before the common errors of loose and uneven winding and wrapping can be overcome. The hair should be properly shaped and tapered, and each strand should be of the proper size. The hair must be wrapped or wound smoothly, evenly, and tightly, and with even tension the full length of the strand. If the hair is not spread evenly over the rod, for the croquignole wind, the sides of the curl will be looser than the inside portion. In spiral wrapping, too much overlapping will prevent the penetration of the steam because of the thickness of the hair, and the wave will be unsatisfactory. To produce ringlets, the ends may be overlapped one hundred per cent.

Bleached or dyed hair, because of its fragility, needs special care in handling. It mats and snarls easily, and when being wound or wrapped should be held at a tension which conforms to its condition and degree of elasticity. When oil is used before the wrapping or winding, a small amount only should be applied to each strand with a piece of cotton. In spiral waving a "double wrap," which is sometimes referred to as "double protection," may be given as an added protection to the hair after it has been wrapped. This consists of placing wool-crepe or gauze over the hair before the tamplet, pad, or sachet is applied.

Strong ringlet ends are more difficult to produce in fine hair than in coarse hair. As the ends of hair are more brittle and absorbent than the remainder of the shaft, end or retention papers or gauze should be used. When necessary, reconditioning oil may be applied to the ends, but it should be applied sparingly. Special reconditioning oils and lotions are supplied by manufacturers for the protection of the ends of the hair in permanent waving.

Steaming the Wave

Steaming, in permanent waving, means the application of moist heat to the hair. The correct steaming time for any texture of hair cannot be estimated without taking a test curl. Some permanent waving machines have heating elements which bring the solution to the steaming point more quickly than others; different processes of waving require softeners of different strengths and different chemical composition. Methods of wrapping differ as to length of steaming time: dry wraps are usually steamed longer than wet wraps.

The time required for the evaporation of the moisture varies with the different waving methods. The hair should be steamed no longer than is necessary for the moisture to penetrate to the center of the hair shaft.

The steaming time depends upon:

1. The texture, condition, and natural curliness of the hair.
2. The make of the permanent waving machine.
3. The type of wave.
4. The strength of the solution.
5. The size of the strand.
6. Altitude. More steaming time is necessary at a high altitude, as it takes longer for the moisture to reach the steaming point than at a low altitude.

Oversteaming will sometimes produce a kinky wave, and at other times a limp wave. In either case, the hair will be dry, brittle, and lusterless, and may break off. When the steaming has been carried to the point of baking the hair, the liquid solution has evaporated, leaving the hair dry. The longer the hair is subjected to dry heat, the more damage will be done to the hair shaft. A strong acid rinse should never be given after an oversteamed wave, nor should the hair be immediately rewaved. **Understeaming** will result in a limp wave, or in no wave at all.

Fine hair requires more steaming than coarse hair, and perfectly straight fine hair requires more time than hair of any other type. Straight hair cannot easily be oversteamed, but it can easily be overstretched, if it is strong and wiry with a

high gloss. If it is dull, soft, and dry, however, it will not require so much steaming. Coarse hair absorbs moisture more quickly than fine hair and requires less steaming.

Dyed hair, upon which a strong softener has been used, and hair that has been bleached before changing from a darker to a lighter shade require a shorter steaming time. When Egyptian henna has been used, the hair shaft is coated with the dye and therefore offers resistance to the steam, and more time is required for steaming.

Bleached hair has been made absorbent by the bleaching agent, and the steaming time will depend upon the degree to which the hair has been weakened by the bleach. Preheating the heaters will shorten the steaming time.

Cooling the Wave

By the "cooling time" is meant, usually, the period between the turning off of the current and the removal of the heaters. There is no set rule for cooling a wave. The procedure used depends upon the type and condition of the hair. In cosmetology, cooling is sometimes referred to as "tempering." White, gray, overbleached, or dyed hair is seldom cooled under the permanent waving machine heaters, as discoloration may result. Upon the removal of the heaters, the patron should be placed under the cool air of the dryer, or a hand dryer may be used, until the hair is thoroughly cooled. The hair may also be allowed to cool naturally. If the hair is unwound while the rods are still warm, its elasticity may be lessened and the result may be an unsatisfactory permanent wave.

Waving Dyed Hair

Hair that has been dyed by modern dyes can usually be given a successful permanent wave. Success depends upon the type of dye that has been used and the experience of the operator. The condition of the hair will be shown by the test curl. If a dye and a wave are both to be given, the wave should come first, as the chemical reaction of the dye to the steaming may cause streaks and discolorations, lighten the hair, or give it a reddish cast.

Egyptian henna usually takes a satisfactory wave, but the same precautions should be used as for dyed hair. Continued applications of henna over a period of years may make the hair dry and brittle. A henna pack given immediately after a wave will take effect more quickly, as the hair has been made more absorbent by the application of the solution and by the steaming.

Compound hennas, "color restorers," and similar preparations form a coating on the hair, and after several coats have been applied it is almost impossible to give the hair a successful wave. Unless the patron is willing to give the information, the operator cannot know the exact nature of the dye that has been used. The waving process will deepen the metallic cast that some dyes give to the hair. The metallic salts of compound hennas make the hair brittle, and heat will usually darken the shade. "Color restorers," so called, sometimes contain sage, and many of them have a sulphur base which may cause, in the waving, an unexpected shade. Some hair tonics contain alcohol and sometimes sulphur, which make the hair dry and brittle and may result in a harsh wave and may discolor the hair.

If the operator has reason to doubt the advisability of waving a head of dyed hair, she should recommend reconditioning treatments until the hair is in condition to be successfully waved.

Waving Bleached Hair

Bleached hair should be waved only by an experienced operator. It is difficult to give a soft wave to bleached hair that has not been put into the best possible condition for the process; reconditioning treatments should always be advised. There is always danger of the hair breaking off. Its elasticity has been lessened, and its shaft weakened and made porous by the bleach. More than one test curl must be taken. The operator must be able to estimate the degree to which the bleach has affected the elasticity of the hair in order to decide correctly on the method of waving, the strength of the solution, and the length of steaming time.

To avoid a fuzzy wave, large sections should be blocked and

large curling rods used. Bleached hair should never be given a narrow wave. A wide wave may be produced by padding the rod before the hair is wrapped. This padding will also protect the hair from contact with the metal rod. The ends will have little resistance and should be well protected.

Overbleached hair will not stretch and will usually break off under the application of heat. If the hair seems spongy and mats easily when wet, it has probably been overbleached.

Waving Gray and White Hair

Special solutions are supplied for waving gray and white hair, and instructions should be carefully followed. Every precaution must be taken in the waving. A patron knows that her white or gray hair will be difficult to wave, and she will expect expert service. If the hair yellows deeply in the test curl, the wave should not be given. Gray and white hair often discolor during the process, and fine white hair will usually take a kinky wave.

The shortest steaming time possible should be given to white or gray hair. After the current has been turned off, the heaters should be removed and the hair left to cool naturally, or the patron may be seated under the cool air of the dryer. When very fine white hair is being waved, if it turns yellow each curl should be gone over, before the hair is unwound and while it is still warm, with a pledget of cotton dipped in bleaching solution. Too much of this solution will weaken the wave. A bluing rinse may be given before the hair is dressed.

When white hair is being waved, the metal rods may be covered with flannel, wool crepe, or cotton gauze to prevent discoloration. The metal clasp on the rod should not come in contact with the hair. End papers should be used to protect the ends. White hair often discolors more quickly at the hairline of the face.

Factors Governing the Success of a Wave

The success of a permanent wave depends upon the following factors:

1. The elasticity of the hair.
2. Even blocking.

3. Winding and wrapping with proper tension.
4. Correct steaming time.
5. Correct amount and character of the solution.
6. Proper contouring of the hair.

The failure of a permanent wave may be due to the following causes:

1. Lack of judgment in classifying the hair.
2. Unfamiliarity with the equipment.
3. Improper cutting and tapering.
4. A careless preliminary shampoo.
5. Omitting test curls.
6. Careless blocking and insufficient tightening.
7. Too strong or too weak solution.
8. Oversteaming or understeaming.
9. Removing the hair from the rods while it is still warm.

The ill health of a patron and the states of menstruation and pregnancy are sometimes given as reasons for the failure of hair to be affected by the permanent waving process. The live cells of the growing portion of a hair, within the follicle, may be influenced by body conditions, but the portion of the shaft which extends beyond the scalp is a horny outgrowth. It is not likely that states of body health can affect it and be responsible for the failure of the hair to take a strong wave, unless the condition is a chronic one which has existed through the growth period of the whole hair, or which has affected the hair indirectly through causing abnormal secretory activity.

The Size of the Wave

The size of the wave, wide or narrow, depends upon the size of the blocking, the amount of hair in the block, and the size of the rod. If a small wave is desired, use smaller blockings and smaller rods.

The Tightness of the Wave

The tightness of the wave, shallow or deep, depends upon the strength of the solution, the tension of wrapping or winding, and the steaming time.

Time Required to Give a Wave

The time required depends upon the texture and condition of the hair, the experience of the operator, and the method of waving. Speed is not so important as attention to details and the practice of all safety precautions. A spiral wave, with an average number of curls, may be completed in from three to four hours; a croquignole wave, in much less time.

Permanency of a Wave

A successful permanent wave will be "permanent" until the wave is cut away by trimming the ends. The average rate of hair growth is about one-half inch per month; there will be little wave left after six months.

Care After a Wave

A permanent wave is not a permanent hairdress, and it will require the same attention as naturally curly hair. The operator should explain to the patron that her permanent should have regular shampoos. Brushing will not straighten the curl, although weak and fine hair should not be brushed vigorously. Brushing gives the natural oil of the scalp an opportunity to reach the ends of the hair, and a wave should always be brushed before a shampoo. Hot oil shampoos and scalp treatments should be advised after the hair has been permanently waved.

Waving New Growth

Waving new growth next to the scalp must be done without overstretching or oversteaming the previously waved hair. The ends of the old wave must be well protected. The winding and the protection given the ends will depend upon the method of waving. Protection usually consists of an application of oil or water.

Permanent Wave Burns

Permanent wave burns and their causes are as follows:

A dry burn is caused by a warm rod or heater coming in contact with the scalp or other part of the body, and may be the result of carelessness or an unavoidable accident.

A **steam burn** is caused by escaping steam, and may be the result of too much solution, careless and uneven blocking, insufficient protection, or defective blocks.

A **pull burn** or **pull blister** is caused by pulling the hair too tightly, and may be the result of careless and uneven blocking or defective blocks.

The scalp should be thoroughly examined after every permanent wave. A dry burn can be recognized immediately, while a steam or pull burn may not be found unless a very complete examination of the scalp is made. A steam or pull burn may not reach a serious stage until after a few days have elapsed. Burns should be treated according to the rules of State Laws and State Boards of Health. First aid is usually permitted in the shop. In some cases a physician should be called or the patron referred to or taken to a physician for examination. If insurance is carried, the insurance company should be notified, in compliance with their instructions.

General Rules and Safety Precautions

1. In case of an accident, turn off the current at once.
2. Sterilize all parts of the machine and all accessories that come in contact with the patron.
3. Do not guarantee the success of a permanent wave.
4. Always make test curls.
5. Protect the patron's scalp, ears, neck, and clothing.
6. Seat the patron under the center of the machine.
7. Examine the scalp before the wave. If there are lesions or abrasions, do not give the wave.
8. Examine the scalp in the presence of a witness, if possible, for injuries or burns after the wave.
9. Keep the machine in working order and all equipment clean, dry, and ready to use; *keep the floor under the machine dry.*
10. Do not waste materials. Moisten a few pads at a time. Pads should not be exposed to the air long after being wet.
11. Keep bottles labelled and corked. When solution is

kept in large bottles, do not open or close them more often than necessary.

12. Follow instructions, and use the proper solution for every wave.

13. Keep informed of all improvements in permanent waving methods.

14. Test all heaters to see that they are working properly. Rust and corrosion will retard the wave.

15. If a patron complains that the heat is excessive in one place, remove the heater and look for the cause.

16. Place a steam towel around the patron's shoulders to protect her from the heaters.

17. Before turning on the current, make a thorough inspection of all felts, bakelites, clips, and other details of "patron's protection."

18. Do not fasten spiral rods closer than one inch from the scalp. The rod must swing free above the protector pad.

19. The block must rock when the winding is finished.

20. Use great care in removing heaters.

21. Test the heating element by making a test curl.

22. Protector pads should be washed in warm water with mild soap, rinsed thoroughly, dried, and wiped off with a sterilizing solution.

23. Use standard supplies.

24. Keep a record of every wave. This is a wise precaution in case of a legal controversy, and it is necessary as a reference when the patron returns for another wave. The record should show: the date; the name and address of the patron; the texture and condition of the hair; whether it has been dyed or bleached, and what preparation has been used; the method of waving; the number of curls; the steaming and cooling time; the result of the wave; and the amount paid.

Giving a Permanent Wave

Methods of permanent waving vary, but the essential details of all methods are similar. The hair is usually first shampooed and dried, blocked, dampened with solution, wound or

wrapped, steamed, cooled, rinsed with cold water, and dressed.

Methods of permanent waving are **spiral** and **croquignole**. Heat for steaming may be supplied by electricity or through chemical action.

Permanent wave heaters are:

1. Spiral or helical for the spiral permanent wave.
2. Split heaters for croquignole waving. A spiral permanent may be steamed with a croquignole heater.
3. Internal heaters; the heat is inside the rod.
4. Chemical. No electricity is used. The heat is derived from the chemicals contained in the pad.

Spiral Permanent Waving

A **spiral**, sometimes called *helical*, wave may be given to hair of any texture. The method of applying the solution and wrapping the hair depends upon the condition of the hair and its texture. The operator should be familiar with the effects of wet and dry wraps, and be expert in the wrapping of a flat wrap, full, half, and quarter twist, and in blocking for the size of wave desired, according to the texture and condition of the hair.

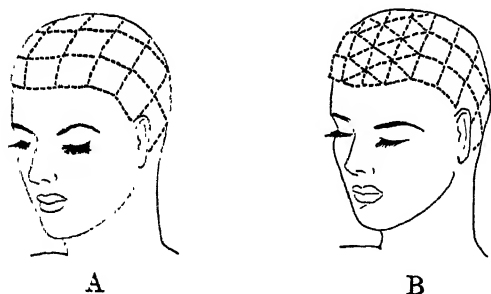


FIG. 20. BLOCKING FOR SPIRAL PERMANENT WAVE. (A) Square blocking. (B) Square and triangle blocking.

A **wet wrap** is made by saturating the hair with solution before it is wrapped.

When a **dry wrap** is given, the hair is wrapped dry and the solution applied by means of a saturated sachet or pad. A

dry wrap is the most commonly used method for all but very fine hair.

Flat wrap. This is the most popular wrap, and it will form flat and even undulations when finger waved. Each turn around the spindle should overlap the previous lap fifty per cent. For long hair, the wrap may be flat for a distance of halfway down the spindle, then wrapped back over the hair to prevent dry and kinky ends.

Full twist. The strand of hair is carried around the spindle with a continuous twist of the wrist. To make ringlet ends, the ends of the hair are overlapped one hundred per cent with a flat wrap.

Half twist. One turn only is given as the strand encircles the spindle, twisting on the same place on the spindle each time around, one-half of the wrap being kept flat. Ends must be wrapped flat and overlapped one hundred per cent if ringlet ends are desired.

Quarter twist. Given in the same manner as a half twist, except that three-quarters of the wrap is a flat wrap.

Wool crepe or gauze is used to control uneven lengths of hair and as a protection to bleached and gray and white hair, and to prevent string marks in the finished wave.

A SPIRAL PERMANENT WAVE

Supplies.¹

Chair cloth	Finger waving lotion
Rubber cape	Sachets, string, and spindles
Neck tissue	Felt protectors
Steam towels	Bakelite or fiber protectors
Cotton pledgets	Metal protector clips
Comb	Felt protectors for ears and forehead
Hairpins and hair net	Wool crepe or gauze
Dish for solution	Record card
Shampoo soap	
Permanent waving solution	

¹ Supplies that come in direct contact with the patron in this and every other manipulative procedure must be sterile.

Preparing the patron.

1. Examine the scalp.
2. Shampoo, if necessary. Give a water rinse only.

Giving the wave.

For wet wrap, wet the hair with solution before wrapping.
For dry wrap, wrap the strands dry.

1. Comb the hair well.
2. Section in one-inch squares or triangles.
3. *Make a test curl.*
4. Wrap string twice around strand, one inch from scalp.
5. Attach string through eyelet of spindle; pull through spindle opening; wrap around spindle twice and put through opening again.
6. Wrap hair around spindle, using flat wrap, full twist, half twist, or quarter twist.
7. Wrap wool crepe or gauze on ends and secure firmly with string.
8. Tighten the hair on the spindle.
9. Apply felt protector and bakelite or fiber between scalp and spindle.
10. Moisten flannel or sachet and place on wrapped hair. Close clip over ruffle of sachet below the spindle. Lightly twist sachet at other end of spindle.
11. Steam for required time.
12. Cool the hair on spindles.
13. Remove metal clips, sachets, spindles, bakelites, and felts.
14. Wet the hair with cold water.
15. Dress the hair.
16. Fill out the record card.

Clean up.

1. Put away supplies.
2. Sweep up waste hair.
3. Put used pads in covered container.

Croquignole Permanent Waving

The croquignole method is always given with a wet wind. The head is blocked in rectangular sections, about three-fourths of an inch wide and two and one-half inches long. The protector block is fastened close to the scalp over the felt pad, the solution applied to the strand, and the hair wound from the ends to the scalp. The hair is held as an even strip



FIG. 21. BLOCKING FOR CROQUIGNOLE PERMANENT WAVE.

or band so that even tension may be maintained in the winding. Each block should be firm but not tight; it should be loose enough to rock slightly. The tapered ends of hair fill the depression in the center of the curling rod and form curls, while waves are produced where the hair is wound around the larger portions of the rod.

CROQUIGNOLE PERMANENT WAVE

Supplies.

Chair cloth	Permanent waving solution
Rubber cape	Finger waving lotion
Neck tissue	Protector blocks and rods
Steam towels	Felt protector pads
Comb, hairpins, and hair net	Pads, sachets, or tamplets
Cotton pledgets	Felt protectors for ears and forehead
Shampoo soap	Retention papers or gauze
Dish for solution	Record card

Preparing the patron.

1. Examine the scalp.
2. Shampoo, if necessary. Give a water rinse only.

Giving the wave.

1. Comb the hair thoroughly.
2. Section and block the hair for the desired hairdress.
3. Apply felts, and then the blocks.



FIG. 22. BLOCKING FOR A COMBINATION WAVE. Either triangle or square blocking of the spiral may be used with the croquignole in giving a combination wave.

4. *Make a test curl.*
5. Apply solution with cotton pledget across and down the strand.
6. Wind the hair on rods; protect the ends with retention papers or gauze.
7. Spread the hair smoothly with the spreader.
8. Moisten sachets, pads, or tamplets; place over wound hair.
9. Steam for required time.
10. Cool.
11. Remove the rods.
12. Remove the blocks and felts.
13. Wet the hair with cold water.
14. Dress the hair.
15. Fill out the record card.

Clean up.

1. Put away supplies.
2. Sweep up waste hair.
3. Put used pads in covered container.

A Combination Permanent Wave

A combination wave is a permanent wave in the process of which both the spiral and croquignole methods of blocking are used.

The hair is blocked by the spiral method on the top section of the head and in one or two blocks below the crown and around the top of the head, and it may or may not be blocked in the same way in front of the ears, depending upon the

hairdress desired and the texture and thickness of the hair. The remainder of the hair is blocked by the croquignole method.

Machineless Permanent Waving

A **machineless wave** is one given without a standard permanent waving machine and which depends upon chemical reaction instead of electricity for its source of heat. The chemical substances which are used, by coming in contact with moisture, produce heat and steam. Solutions of varying concentrations are supplied for different textures of hair. In steaming, the heat reaches a certain point and then gradually lowers. Chemically heated pads are used, in which case they are left on until cool, as well as liquids without pads in connection with apparatus of one type or another. A machineless wave can be given with either the spiral (wet wrap) or croquignole methods.

The operator should observe all safety precautions and be familiar with the method used. The manufacturer's instructions for winding the hair, moistening and applying the pads, and all other details must be carefully followed. Pads may or may not be kept in an airtight container, according to the instructions of the manufacturer. Pads should be used only once.

Questions

1. Give a definition for permanent waving.
2. For what purpose is a permanent wave given?
3. What should an operator know in order to give a successful permanent wave?
4. What abilities should she possess?
5. How much is known about the changes that take place in the hair shaft during the permanent waving process?
6. Why is it necessary to classify hair as to elasticity and texture before permanently waving it?
7. Why cannot all types of hair be successfully permanently waved?

8. Does all hair possess the same degree of elasticity?
9. What is meant by the "hygroscopic quality" of hair?
10. How is hair classified for the purpose of permanent waving?
11. Does fine hair require as much steaming as coarse hair?
12. Why may coarse hair be easily oversteamed?
13. What special attention should be given to the waving of "cotton fine" hair?
14. Why does naturally curly hair sometimes appear straight?
15. How is a water test for natural curliness made?
16. What is the usual appearance of hair of normal elasticity?
17. What is the usual appearance of hair that will not respond to the extension necessary to permanently wave it?
18. When a patron's hair cannot be classified, what precautions should be taken?
19. For what purpose is a solution used in permanent waving?
20. Upon what does the quantity of solution depend?
21. What may be the result if insufficient solution is used?
22. What may be the result if too much solution is used?
23. Name three common softening agents used in permanent waving solutions.
24. Why is it necessary to use solutions of different strengths?
25. What may be the effect of too strong solution? Too weak solution?
26. How is hair reconditioned before a permanent wave?
27. What is the purpose of a reconditioning treatment, and for what conditions should it be advised?
28. When should a reconditioning treatment be given after a wave?
29. Is the hair usually cut before or after a permanent wave?
30. Can satisfactory ringlet ends be given to hair with stubby ends?
31. Should the hair be cut before or after the preliminary shampoo?
32. How is hair usually cut in preparation for a permanent wave?

33. What may be the result if ends are tapered too much?
34. What precautions should be observed when giving a preliminary shampoo?
35. Why is it usually necessary to shampoo the hair before a wave?
36. Why should the hair be dried before waving?
37. Should bleached hair be shampooed immediately before a wave?
38. For what purpose are test curls made?
39. Why should a test curl always be made before waving the entire head?
40. How is a test curl taken?
41. What conditions should a test curl show on dyed hair?
42. How should a test curl be examined and treated to determine the strength of curl?
43. How is hair blocked for spiral waving?
44. When is triangular blocking used in spiral waving?
45. How is hair blocked for croquignole waving?
46. How is hair blocked for a combination wave?
47. Why is blocking an important detail in the waving process?
48. What may be the results of careless blocking?
49. What kind of wave will result from making too small sections?
50. If too large sections are taken, what kind of wave will result?
51. How should very thick hair be blocked?
52. Upon what does the number of sections depend?
53. Should the same method of wrapping or winding be used for all hair?
54. What are the two methods of wrapping and winding hair for a permanent wave?
55. How is the hair wrapped for a spiral wave?
56. How is the hair wound for a croquignole wave?
57. What is a "wet wrap"? When is the solution applied?

58. What is a "dry wrap"? How and when is the solution applied?
59. What are the common errors made in wrapping and winding?
60. How should the hair be cut for proper wrapping or winding?
61. Why should the hair be wrapped or wound smoothly and tightly?
62. In croquignole winding, why should the hair be spread evenly?
63. Why should too much overlapping be avoided in spiral wrapping?
64. How should ends be wrapped to produce ringlets?
65. What precautions should be taken when wrapping or winding bleached and dyed hair?
66. For what purpose is wool crepe used in waving bleached and dyed hair? What is meant by a "double wrap," and when is it used?
67. For what purpose are end or retention papers used?
68. How are brittle and absorbent ends protected in permanent waving?
69. What is meant by steaming a permanent wave?
70. Upon what factors does the steaming time depend?
71. Are dry wraps steamed as long as wet wraps?
72. How long should hair be subjected to the steaming process?
73. In what way does altitude affect steaming time?
74. What kind of wave will oversteaming the hair produce?
75. What are the dangers of subjecting the hair to dry heat?
76. Should an acid rinse be given after an oversteamed wave?
77. What will be the result of understeaming a wave?
78. Which requires more steaming time, fine or coarse hair?
79. Why does coarse hair require less steaming than fine hair?
80. Discuss the steaming time for dyed or bleached hair and hair on which Egyptian henna has been used.
81. Why does Egyptian henna require more steaming time than virgin hair?
82. Why is the steaming time for bleached hair shorter than for virgin hair?

83. Upon what does the steaming time for bleached hair depend?
84. What is the reason for preheating the heaters?
85. What is meant by the cooling time? What other term is used?
86. Upon what does the procedure used for cooling depend?
87. Why is white, gray, overbleached, or dyed hair seldom cooled under the permanent waving machine heaters?
88. After the heaters are removed, how may the hair be cooled?
89. What is the danger of unwinding the hair while the rods are still warm?
90. Can dyed hair be waved satisfactorily?
91. Upon what does the success of waving dyed hair depend?
92. If a dye and a wave are to be given on the same day, which should come first?
93. Can a satisfactory permanent wave be given over Egyptian henna?
94. Why will a henna pack take effect more quickly if given immediately after a permanent wave?
95. What kind of dyes offer the most resistance to the steaming?
96. Can a good wave be given to hair upon which a compound henna has been used? What results may sometimes occur?
97. Why cannot hair on which a "color restorer" has been used always be given a satisfactory wave?
98. What is the usual reaction of the sulphur of a hair tonic to steam and heat?
99. Why should bleached hair be waved by an experienced operator?
100. Why does bleached hair sometimes break off when permanently waved?
101. How may a fuzzy wave be avoided when waving bleached hair?
102. What precautions should be taken when waving bleached hair?
103. Why should bleached hair never be given a narrow wave?
104. Why is it necessary to protect the ends when waving bleached hair?

105. Can overbleached hair usually be successfully waved?
106. Why should special precautions be taken when waving gray and white hair?
107. If white hair yellows in the test, should a wave be given?
108. Should white hair be given a long or short steaming time?
109. How is bleaching solution applied to white hair after it has been waved?
110. What will be the result if white hair comes in contact with metal rods? How should it be protected?
111. Name some of the factors upon which the success of a permanent wave depends.
112. To what factors may the failure of a permanent wave be due?
113. To what extent can a permanent wave be influenced by the health of a patron?
114. Upon what does the size of a permanent wave depend?
115. Upon what does the tightness of a wave depend?
116. What is the average length of time taken for the giving of a spiral wave? A croquignole wave?
117. Upon what factors does the time required to give a wave depend?
118. To what extent may a permanent wave be said to be "permanent"?
119. How long will a permanent wave last?
120. Discuss the care of the hair after a wave.
121. Will brushing straighten a permanent wave?
122. How should new growth be permanently waved?
123. What precautions should be taken when waving new growth?
124. What different kinds of burns may occur during a permanent wave?
125. How may a dry burn be caused? A steam burn?
126. What may be the cause of a pull burn?
127. What steps should be taken by the operator if a burn occurs during a permanent wave?
128. In case of an accident during a wave, what is the first thing an operator should do?
129. Can the success of a permanent wave be guaranteed?

130. Why should the scalp be examined before giving a wave?
131. Why should the scalp be examined after a wave?
132. Under what circumstances should a wave not be given?
133. Why should heaters be frequently tested?
134. If the patron complains of too much heat, what action should be taken?
135. What is meant by "patron's protection"? How is this accomplished?
136. How may the heating element be tested?
137. What details should a patron's permanent wave record show?
138. Briefly describe the process of giving a permanent wave.
139. What are the two methods of permanent waving called?
140. In what different ways is heat for permanent waving supplied?
141. Name the different kinds of permanent wave heaters.
142. How is the hair blocked for a spiral wave?
143. Give the different ways of wrapping the hair for a spiral wave.
144. How is a wet wrap made?
145. How is a dry wrap given?
146. How is a flat wrap given? How may a flat wrap be given to long hair?
147. How is a full twist made on the spindle?
148. How is the hair wrapped in giving a half twist?
149. For what purposes are wool crepe and gauze used in permanent waving?
150. Is a croquignole wave a wet or a dry wrap?
151. How is the hair blocked for croquignole waving?
152. How is the hair wound for croquignole waving?
153. What is meant by a combination wave?
154. How is the hair blocked for a combination wave?
155. What is machineless permanent waving?
156. How is the heat generated in machineless waving?
157. Why should pads be used no more than once?

Chapter XVIII

SCALP MASSAGE

Scalp massage is given for the purposes of (1) maintaining the normal health of the scalp and hair, and (2) correcting certain abnormal conditions of the scalp and hair.

To give a scalp treatment efficiently, an operator should have a knowledge of: diseases of the scalp and hair; abnormal conditions of the scalp and hair that may be treated in the shop; anatomy of the head and neck (bones, muscles, nerves, and blood supply); the structure of hair; factors affecting hair growth; effects of manipulations, steam, hot and cold applications, therapeutic lights, infra-red rays, and electric currents on the scalp and hair; and the composition of oils, tonics, lotions, and pomades, and their probable effects on the scalp and hair.

An operator should have the ability: to observe sanitary and safety precautions; to prepare a patron, cleanse and steam the scalp, and give massage with or without electricity; to use therapeutic lights and infra-red rays; and to apply oils, tonics, pomades, and lotions to a normal scalp or to any abnormal scalp condition that can be treated in the shop.

A normal scalp needs manipulations to exercise its tissues in order that it may produce healthy hair. A normal scalp will be comparatively loose and pliable and free from eruptions and symptoms of disease. Normal hair is strong and elastic and properly lubricated; its cuticle has no ragged scales.

Diseases of the scalp and hair, such as psoriasis, ringworm, eczema, and so forth, should not be treated in the shop. If the scalp is tender or inflamed and shows eruptions, a scalp massage should not be given.

Abnormal conditions that an operator may attempt to correct or improve include:

1. Overdry and overoily scalp and hair.
2. Tight scalp muscle.
3. Brittle and split hair.
4. Falling hair (in excess).
5. Alopecia.
6. Dandruff (in excess).

The natural texture of hair cannot be changed by scalp treatments; but by brushing it, shampooing it, steaming it, applying oils and tonics, and massaging the scalp, surface scales may be loosened and removed, the hair softened, and certain abnormal conditions improved. Strong shampoo soaps, hard water, hair dyes and bleaches, permanent waving solutions, and finger waving lotions remove much of the natural oil from the hair shaft. The hot air of the electric dryer, the dry heat of iron curling, overbleaching, and oversteaming during a permanent wave have a tendency to make the hair dry and brittle.

Regular scalp massage will tend to restore the natural elasticity to the hair and make it easier to wave and tint.

The Scalp

The **scalp** is that part of the integument of the human head (in anatomy usually including the subcutaneous structures) that is usually covered with hair. With its subcutaneous structures, which are well supplied with blood vessels, nerves, hair follicles, and sweat and oil glands, the scalp consists, broadly stated, of three layers: the skin, the subcutaneous tissue, and the occipito frontalis muscle and its aponeurosis. Beneath these layers will be found a layer of connective tissue and the pericranium, the thin membrane which covers the bones of the skull.

The hair structures of the scalp are the papilla and follicle. Hair grows from a hair papilla which lies in the scalp tissues at the bottom of the hair follicle. The hair-making cells of the papilla are constantly at work forming a new hair to replace the one which will fall out normally when its life cycle is ended. Unless a hair papilla is supplied with freshly oxygenated blood, carrying the materials necessary to make hair,

the papilla will, consequently, fail to produce a new hair. Exercise of the scalp muscle by massage, and the application of therapeutic lights will stimulate the circulation of the blood to the scalp tissues. Factors other than an insufficient blood supply may cause a papilla to cease to function. Treatment for such conditions cannot, of course, be given in the shop.

Overoily Scalp and Hair

Overoiliness of the scalp and hair is due to different physical conditions. Excess secretions from the sebaceous glands cover the surface of the scalp and form a coating on the hair shaft. The operator can only remove the oil; the cause of the condition cannot be diagnosed in the shop. Overoiliness packs the hair to the head and makes it greasy, heavy, and hard to wave and dress. Cleansing and massaging and applications of tonics and astringents are the usual methods for treating this more or less common condition.

Overdry Scalp and Hair

By a dry scalp is meant one that is not supplied with a normal amount of oil from the sebaceous glands and moisture from the sudoriferous glands. When these glands fail to perform properly their functions of secreting oil and perspiration, the scalp becomes dry and the hair becomes dull, loses its gloss, breaks off easily, and may fall out. Overdry hair stands out from the head and makes a neat hairdress difficult to achieve. The oil may be prevented from reaching the scalp and hair by an accumulation of scales of dandruff which clog the openings of the hair follicles. A thorough cleansing of the scalp and hair, followed by a hot oil treatment, is advised for this condition. The steamer or steam towels will prepare the scalp for the application of the hot oil, which may be used with high-frequency, galvanic, or faradic, current or therapeutic lights to increase the softening action of the oil.

Alopecia

Alopecia is the term used to designate the relative absence of hair on all or a part of the body, whether or not the first

cause of the condition is known. Hair loss may be transient or permanent, congenital or acquired. Any condition that will destroy hair papillae and follicles or inhibit their function will cause hair loss.

When the hair falls out during or following a constitutional disease (alopecia symptomatica), the hair usually grows again. The bald patches of alopecia areata, which occur without inflammation or disease, are without known cause. The patches often show regrowth with, or without, stimulating treatment. The general treatment of alopecia areata should be in the hands of a physician, but the high-frequency current may be used to stimulate the tissues of the bald areas, and applications of a local irritant, such as iodine, may be beneficial.

Seborrhea, possibly due to bacterial stimulation and the parasites of favus and tinea, may leave scars that will not respond to any stimulating massage or local application. The papillae of scar tissue cannot produce hair. Acne pustules on the scalp may cause permanent bald spots.

Of the baldness of the head, so common in men, and called, broadly, *alopecia praematura*, which is a form produced by agencies less direct than microorganisms of a constitutional disease, C. H. Danforth says:¹

Various causes for this baldness have been suggested, and it is not improbable that some of them are effective in occasional instances. The fact that baldness is generally confined to certain areas and may be associated with luxurious growth of hair on other parts of the scalp does not support the popular notion that cutting the hair, wearing of headgear, or even dandruff are significant factors in its production. On the other hand, whatever the ultimate cause, it is difficult to regard the loss of hair from the scalp, or any part of it, as other than the result of an alteration of function which may induce a set of mild manifestations that are the product and not the cause of the approaching alopecia.

It seems probable that premature baldness is most often hereditary, as it appears usually before the thirtieth year and without obvious cause. Since congenital baldness has been

¹ Danforth, C. H., *Hair*. Chicago, Ill.: American Medical Association, 1925, p. 109.

noted in families, heredity has been accepted as a probable factor, as there is usually an associated lack of development of the nails and teeth.

If an operator is able to recognize an abnormal condition of the scalp and hair, she can explain to her patron the consequences of neglecting the condition, and, at first signs of hair loss, advise her to consult a physician and suggest stimulating scalp massage while the hair structures are still alive and functioning. The only treatments that can be given in the shop for alopecia are shampooing and massage, electric currents, therapeutic lights, and the application of tonics, lotions, and pomades. Special attention should be given to the temples and the crown of the head, where the scalp tissues lie closest to the skull and where the circulation of the blood is most likely to be decreased.

Alopecia may be postponed by observing the rules of health, by regular exercise of the scalp muscle, which receives no exercise from within, by the sterilization of all objects used on the hair and scalp, and by perfect cleanliness of the hair and scalp. The scalp should not be permitted to become overly oily; lubrication should be provided so that it will not become overdry.

Dandruff

Dandruff is a scurf that forms on the head and comes off in small particles and scales. The two forms which appear as symptoms of seborrhea, a chronic disease of the sebaceous glands, are seborrhea oleosa, in which the discharge is oily, and seborrhea sicca, which is characterized by the formation of dry scales or scabs. It is within the province of an operator to cleanse the scalp and free it of scales, but she should be familiar with the diseases of the scalp in order to know to what extent she may proceed with her scalp treatments. Common dandruff should be removed, and a cleansing lotion may be applied before the shampoo to loosen and dissolve the scales. The shampoo following a scalp massage for the removal of dandruff should be especially thorough, with several rinsings.

When an ointment is used or a tonic is rubbed into the scalp,

it should be sparingly applied, but every part of the scalp should be reached. If microorganisms are present in a neglected area, they will multiply with rapidity and there will be a return of the scales if they represent an abnormal condition of the scalp.

Tonics and Pomades

Lotions labeled *tonic* come under two general types. Some of them are used for stimulating the scalp, and others for dressing the hair. Scalp conditions for which tonics are recommended include: oily scalp, dry scalp, dandruff, and falling hair. Special instructions are provided by the manufacturer for using each product; nearly all of them call for cleansing, brushing, and massaging before the tonic is applied.

TONIC APPLICATION

1. Massage to stimulate the circulation of the blood and loosen scales.
2. Hot towels or steamer to soften scales and dirt.
3. Part the hair in one-fourth-inch sections and apply the tonic to the scalp with a cotton pledget.
4. Use the therapeutic light while applying the tonic.
5. Finish with a few scalp manipulations.

Pomades are used for the purpose of loosening scales and dirt from the surface of the scalp, or as a dressing for the hair.

POMADE APPLICATION

1. Remove a small amount of pomade from the jar with a sterile spatula.
2. Part the hair in one-fourth-inch sections and rub the pomade into the scalp with the fingertips.
3. Use the therapeutic light.
4. Finish with a few manipulations.

Rules and Precautions

1. Sterilize your hands before and after massaging the scalp.

2. Use only sterile combs, brushes, spatulas, and towels; use a freshly sterilized comb to dress the hair after a scalp massage.

3. Use standard materials; label jars and bottles; keep jars covered and bottles corked.

4. Do not guarantee to grow hair or to prevent hair loss by manipulating scalp tissues.

5. Do not guarantee the effects of any oil, lotion, tonic, or ointment. There is no known preparation that will cause hair to grow on a bald-spot.

6. As a diagnostic procedure, scalp massage should be given as frequently and continued over as long a period of time as will be necessary actually to bring about some improvement in the condition or to make certain that no improvement can be made—from one to three times weekly, depending upon the stage of hair loss.

7. Do not massage the scalp immediately before a permanent wave, a hair dye, or a bleach. The patron's scalp may be too sensitive to endure both processes the same day.

8. If a series of scalp treatments is given, the hair will not need shampooing oftener than once a week.

9. The length of time taken for a treatment will depend upon the condition of the scalp and hair.

10. Do not waste materials; use no more oil than necessary. Be sure to remove all the oil when giving the after-shampoo.

11. Do not pull the patron's hair or rotate with too much pressure in one place or for too long a time.

12. Use gentle vibrations over nerve centers.

13. Be sure that the electric equipment is in working order.

14. Do not use the high-frequency current over a combustible substance.

15. When using a therapeutic light, lift the strands of hair with the comb so that the light may reach the scalp.

16. Use special precaution when handling electric appliances:

- a. Make connections and disconnections carefully.
- b. Do not leave the current on too long.
- c. Do not drop electrodes.
- d. Do not spill water on cords.

e. Do not use the high-frequency apparatus with too strong current, over tonics composed of combustible substances, or for longer than ten minutes at a time.

17. Adjust the steamer to the proper height and be sure that the jar is full of water; do not leave the patron while she is under the steamer.

Scalp Massage

Scalp massage is defined as the manipulation of the scalp muscle with the fingers or an electric appliance. Massage is one of the oldest practices used to stimulate the growth of hair by affecting muscular tissue and the circulatory and nervous systems.

The beneficial results which may possibly be obtained by giving scalp massage over a period of time include:

1. Increase of blood supply to the scalp.
2. Stimulation of the activities of the glands of the skin.
3. Strengthening of the scalp muscle.
4. Relaxation of nervous tension.
5. Stimulation of hair growth, provided the papillae are alive and functioning.

The muscles manipulated when giving a scalp treatment are: occipito frontalis, temporal fascia, trapezius, platysma, and sterno-cleido-mastoid.

The principal nerves of the scalp are: supra-orbital, temporal, great auricular, great occipital, lesser occipital, and posterior auricular.

The blood supply of the scalp is furnished principally by branches of the external common carotid artery.

SCALP MASSAGE

Supplies.²

Towels	Spatulas
Neck strip	Cleansing lotion
Chair cloth	Therapeutic light
Brush and comb	Tonic or pomade
Cotton pledgets	Glass or porcelain dish

²Supplies that come in direct contact with the patron in this and every other procedure must be sterile.



A. Stand at the left side of the patron. Place the balls of the fingers of the left hand on the scalp at the hairline. Place the right hand on the occipital muscle, spreading the fingers gradually, and rotate each finger with pressure; one hand rotating one way, the other hand the other way, until the fingers meet on the center of the head. The fingers should never lose contact with the scalp, but the pressure should be relieved. Repeat three times.

B. Move to the back of the patron. At the hairline, cup the ears with the hands. Work toward the center, rotating with one hand one way, with the other hand the other way, until the balls of the fingers meet at the top of the head. Repeat three times.



C. Place the balls of the first three fingers of both hands on the posterior auricular artery and nerve. Rotate with one hand one way, with the other hand the other way to the vertex of the head. Repeat three times.

D. Place the fingers lightly on the sides of the scalp and massage with the balls of the thumb, using rotary movements close together. From the base of the occipital muscle, work over the occipital nerve, muscle, and artery to the vertex of the head. Repeat three times.

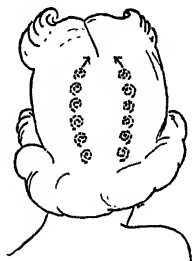


FIG. 23. SCALP MANIPULATIONS.

E. Massage neck and shoulders as for facial massage: Place the hands on the shoulders at the neck, thumbs in front, palms and fingers at the back. Rotate or slide across the shoulder, down the back, then bring the fingers together at the spine. Slide up the spine with pressure. Repeat three times.

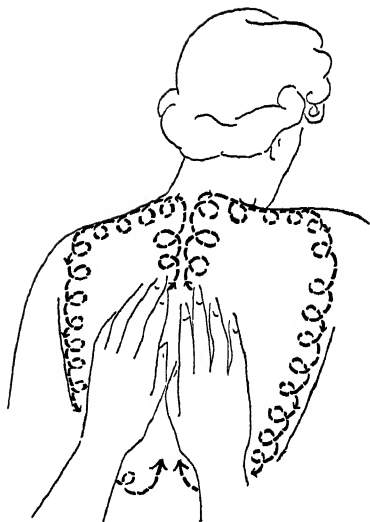


FIG. 23. (CONCLUDED).

Preparing the patron.

1. Adjust the chair cloth and neck strip.
2. Examine the patron's scalp.

Giving the scalp massage.

1. Brush the hair.
2. Apply cleansing lotion with a cotton pledget.
3. Give massage.
4. Apply pomade or tonic sparingly.
5. Use therapeutic light.
6. Dress the hair.

Clean up.

1. Put away supplies; sterilize equipment.
2. Place used towels in a covered container.
3. Leave the booth in perfect order.
4. Wash your hands.

Scalp Massage with Electricity

High-frequency current is usually used in giving a scalp massage with electricity. Do not use high-frequency over

tonics containing combustible substances. Use special tonics for dry hair and oily hair after manipulations with electricity have been given.

To use high frequency, place the electrode in the handle, plug the cord from the handle into the wall socket, and turn the screw on the handle to adjust the current. Use high frequency for not more than ten minutes at one time.

Using high frequency by the direct method. Use the scalp electrode. After adjusting the current, place the thumb and three fingers of the left hand on the scalp electrode, and the little finger on the patron's head, and then place the electrode on the patron's scalp. Remove the thumb and fingers from the electrode and scalp, and move the scalp electrode lightly over the scalp. Always contact the hand with the scalp electrode and the scalp when placing it on the patron's scalp and also when removing it from the scalp.

Using high frequency by the indirect method. Place the handle containing the facial or metal electrode in the patron's hand. Place your left hand on the patron's forehead. With the right hand, turn the current on slowly to the proper strength. Give the scalp massage. When the manipulations have been completed, turn off the current. Always contact the patron by keeping your hand on the patron's forehead when turning the current on and off.

Using faradic current. Connect the wall plate to the wall socket. Wrap the carbon cylinder electrode with wet cotton, connect it to the conducting cord, and place it in the patron's hand. Place the wrist electrode on your wrist, with wet cotton under the metal, tighten the band, connect the conducting cord to the electrode, and place this hand on the patron's forehead. Use the free hand to place selector switches on F and P, or F and S. Turn the rheostat slowly to the proper degree, from 10 to 15. Proceed with manipulations. To disconnect, keep contact with the patron and turn the rheostat and selector switches to zero. Remove the conducting cords from the patron's and the wrist electrodes. Disconnect the wall plate.

Using galvanic current. Test for polarity. For dry scalp, to open the pores, use the current before the manipulations are given. The patron holds the carbon cylinder electrode connected to the positive pole. The comb or sanitary hair brush electrode is connected to the negative pole and is used directly on the scalp and hair. Turn the selector switch on G and G, the rheostat on 15, and use the electrode for not more than ten minutes. For an **oily scalp**, to contract the pores, use the current after the manipulations have been given. The patron holds the carbon cylinder electrode connected to the negative pole. The comb or sanitary hair brush electrode is connected to the positive pole, and is used directly on the scalp and hair. Turn the selector switch on G and G, the rheostat on 15, and use for no longer than ten minutes. **To disconnect**, keep contact with the patron, turn the rheostat and selector switches to zero, and remove the conducting cords from the electrodes. Disconnect the wall plate.

HOT OIL TREATMENT

Supplies.

Towels	Brush and comb
Neck strip	Cotton pledgets
Rubber cape	Hot oil
Chair cloth	Shampoo soap

Preparing the patron.

1. Place neck strip, rubber cape, and chair cloth.
2. Examine the scalp.

Giving the treatment.

1. Brush the hair.
2. Part the hair and apply the hot oil with cotton pledgets.
3. Comb the oil to the ends of the hair.
4. Massage.
5. Place the patron under the steamer for five minutes.
Note: The steamer may be used both before and after the application of hot oil.
6. Give a shampoo, with three soapings and rinsings.

7. Give a brightening rinse, if desired.
8. Dress the hair.

Clean up.

As for a scalp massage.

Questions

1. For what purposes is scalp massage given?
2. In order to massage the scalp properly, what should an operator know?
3. What abilities should she possess?
4. Why is massage beneficial to a normally healthy scalp?
5. Describe the appearance of a normal scalp.
6. Describe the appearance of normally healthy hair.
7. Should diseases of the scalp be treated in the shop?
8. Name some diseases of the scalp that should not be treated in the shop.
9. Under what circumstance should scalp massage not be given?
10. Name some abnormal conditions that may be treated in the shop.
11. Can scalp treatments change the natural texture of the hair?
12. How may abnormal conditions of the scalp and hair be improved by scalp massage?
13. Give some of the causes of dry and brittle hair.
14. Why is scalp massage advised when preparing the hair for a wave or tint?
15. Describe the scalp.
16. Of how many layers does scalp tissue consist?
17. Name the hair structures found in the scalp.
18. Why is a normal blood supply necessary to the health and growth of the hair?
19. How do oxygen and food reach the hair papillae?
20. How may the circulation of blood to the scalp be increased?
21. What effect will a diminished blood supply have on the scalp and hair?

22. What is the cause of overoily scalp and hair?
23. What is the effect of excess oil on the hair?
24. Why is overoily hair hard to wave and dress?
25. What treatment should be advised for overoily hair and scalp?
26. What is meant by overdry scalp and hair?
27. How does the functioning of the sebaceous glands affect the scalp and hair?
28. What is the appearance of overdry hair?
29. Why is dry hair difficult to dress?
30. Why should a dry scalp be thoroughly cleansed of scales and dirt?
31. What treatment should be advised for overdry hair?
32. For what purpose is the steamer used?
33. What is alopecia?
34. What conditions of the hair papilla and follicle may cause hair loss?
35. What is alopecia symptomatica?
36. What is the cause of alopecia areata?
37. How may alopecia areata be treated in the shop?
38. How do diseases from bacterial stimulation and parasites affect the hair and scalp?
39. Will hair grow on scar tissue?
40. What is alopecia praematura?
41. Has it been proved that dandruff, cutting the hair, and the wearing of a tight hat cause baldness?
42. What is the most probable cause of congenital baldness?
43. Why should an operator be able to recognize the signs of approaching baldness?
44. Why should scalp massage be given while the papillae are still producing hair?
45. What treatments may be given in the shop for alopecia?
46. How may baldness possibly be postponed?

47. What is dandruff?
48. Name the two forms of dandruff.
49. Define seborrhea. What is the oily type called? The dry type?
50. How should common dandruff be treated?
51. Why should the application of an ointment or tonic for dandruff be especially thorough?
52. For what purposes are hair tonics used?
53. For what conditions of the scalp are tonics recommended?
54. How should a tonic be applied to the scalp?
55. For what purposes are pomades used?
56. Describe the application of a pomade to the scalp.
57. What rules of sterilization and sanitation should be observed when giving a scalp massage?
58. Can massage be guaranteed to grow hair on the scalp?
59. Will massage always prevent hair loss?
60. Name some preparations that will cause hair to grow on a bald spot, if the hair structures have lost their power to produce hair.
61. How frequently should scalp massage be given?
62. Should a scalp massage be given immediately before a wave, dye, or bleach?
63. What precaution should be taken when using a therapeutic light?
64. Give some special precautions to be observed when using electric appliances.
65. Define scalp massage.
66. What beneficial results may be expected from scientific massaging of the scalp?
67. Name the principal muscles manipulated during a scalp treatment.
68. What are the principal nerves of the scalp?
69. What vessels supply blood to the scalp?
70. Describe the process of a scalp massage.

71. Why should the high-frequency current not be used over tonics containing combustible substances?

72. How is high frequency used by the direct method?

73. How is high frequency used indirectly?

74. Describe the use of the faradic current for scalp massage. How would you disconnect the electric current?

75. How is scalp massage given with the galvanic current? How would you disconnect the current?

76. How is a hot oil treatment given to the scalp and hair?

Chapter XIX

BLEACHING AND COLORING

To bleach hair or color hair to a uniform shade, without streaks, discolorations, or injury to the hair, an operator should have a **knowledge** of: diseases and abnormal conditions of the scalp and hair; the structure of the skin and hair; the differences between virgin hair (hair that has never been bleached or dyed) and bleached and dyed hair; the chemical composition of bleaching agents and dyes and their effects on scalp tissues, on hair of all textures and colors, and on hair in any condition; all approved methods of applying bleaches and dyes and the probable results to be obtained; the time required to soften hair of all textures; the time required to develop the desired shade; the effect of applying one dye over another; the effect of overbleaching hair; the effect of overlapping a bleach or dye; the effects obtained by reconditioning hair and by applying dye removers; and the effects of strong sunlight, salt water, strong shampoo soaps, acid rinses, permanent waving solutions, and heat on bleached or dyed hair.

An operator should have the **ability**: to practice all methods of sterilization; to use all safety precautions; to estimate the degree of elasticity and resistance of hair; to make a patch test for predisposition to skin disease; to select the proper shade of dye; to mix a bleach or dye; to prepare the hair and apply any kind of bleach or dye; to give a touch-up to new growth; to dilute a bleach or dye; to hasten or retard the action of a bleach or dye; to combine tints; to time correctly a bleach or dye; to remove streaks and discolorations from the hair; to remove dye from hair of all textures and in any condition; to dye bleached hair to its natural shade; and to recondition bleached and dyed hair.

Bleaching the Hair

Bleaching is the process of removing natural coloring matter from the hair. A bleach should never be given to a patron whose scalp is not free from eruptions and abrasions.

The function of the bleaching agent is to soften the hair shaft and dissolve or reduce to a lighter shade the grains of pigment in its inner layers of cells. Bleaching makes the hair porous of texture as well as lighter of color. The shades that may be obtained range from light brown and golden brown to straw color and platinum, depending upon the basic color of the hair or the formula of the bleach. There are no circumstances under which a bleach can be guaranteed. The process will not injure normally healthy hair unless too strong a bleach is used or the bleach is left too long on the hair, and it will not affect any natural curliness unless the hair is overbleached. Continued use of bleaches, however, will make some hair over-dry and brittle.

A bleach may be applied in one of two forms:

1. **Liquid form**, consisting of hydrogen peroxide (H_2O_2) and ammonia (NH_3).

2. **Paste form**, made by mixing hydrogen peroxide with white henna (magnesium) or soap flakes, which are used as carriers for the liquid and have no effect in the bleaching process. Antiseptic oil is sometimes added to the peroxide and ammonia; in this case the treatment is called an anti-septic oil bleach.

Hydrogen Peroxide

Hydrogen peroxide is the safest and most dependable agent for bleaching human hair. It is a clear liquid with a pungent odor and a salty taste. Its application makes the hair porous in texture and lighter in color. Seventeen- or 20-volume hydrogen peroxide is commonly used. If a solution of less volume is used, it will act too slowly.

The action of peroxide can be quickened by ammonia, lights (dry heat), and steam towels or the steamer (moist heat). Its action on the hair will continue as long as oxygen is being

liberated. Its action may be retarded by adding water or oil to the bleach mixture, or by drying the hair.

Hydrogen peroxide of sufficient strength will bleach all textures of hair. When a small amount of ammonia is added, the action of the peroxide is quickened. Concentrated ammonia, 26 to 28 per cent, is used, and the quantity added to the peroxide depends upon the texture and color of the hair to be bleached. The amount of ammonia in the bleach will affect the shade in proportion. Three to five drops of ammonia to one ounce of peroxide may be generally used without giving a reddish cast to the hair.

Rules and Precautions

1. Wash your hands; use sterile linen, combs, brushes, and swabs.

2. All bleaching treatments should be considered confidential.

3. Protect the patron's skin, clothing, and your own hands. The bleach should not touch the skin of the face or neck.

4. Do not use too strong a bleach or leave it on too long. The texture and condition of the hair and the color desired determine the strength of the bleaching formula and the time it is to be left on the hair. Overbleached hair is strawlike and brittle, and usually of an artificial shade. The principal causes of overbleaching are:

- a. Overlapping.

- b. Too much ammonia in the bleach.

- c. Too long an application of the bleach on the hair.

- d. Bleaching very dark hair to a lighter shade. This requires so strong a bleach that the hair is made over-porous and dry.

5. Be sure that the hydrogen peroxide is fresh; do not open the bottle until ready to use it.

6. Measure peroxide and ammonia carefully.

7. Do not expose the bleach mixture to the air for too long a time.

8. Give a preliminary shampoo if the hair is excessively oily and dirty. Do not irritate the scalp during a shampoo; never give an acid rinse before a bleach.

9. Work rapidly, in order to produce a uniform shade and to prevent streaks.

10. Do not have on the swab more moisture that is to be pressed into the resistant hair next to the scalp than the hair can absorb. This will prevent overlapping.

11. Watch the development carefully; more time is required to bleach oily hair than dry hair.

12. A towel, cellophane, or waxed paper may be placed over the head to prevent the bleach from drying too quickly.

13. When the desired shade is obtained, give the shampoo. Remove all paste mixture before applying the shampoo soap.

14. Advise your patron to have an egg shampoo with a hand dry for her bleached hair.

15. During a permanent wave, give bleached hair a shorter steaming time than virgin hair.

16. Keep a complete record of all bleaching treatments.

A VIRGIN BLEACH

Supplies.¹

Towels	Cream
Neck strip	Shampoo soap
Rubber cape	17- or 20-volume peroxide
Small brush or swab	Ammonia
Comb	Wooden spoon and earthen dish
Spatulas	Record card

Preparing the patron.

1. Examine the scalp for scratches, abrasions, and eruptions, and for texture and condition of the hair.
2. Protect the patron as for a plain shampoo.
3. Shampoo the hair, if necessary.

Giving the bleach.

1. Mix the bleach, using 17- or 20-volume hydrogen peroxide, and ammonia for the reddish cast desired.
2. Cream the hairline.

¹Supplies that come in direct contact with the patron in this and every other manipulative procedure must be sterile.

3. *Note.* There are two procedures used in giving a virgin bleach. The first one starts at the scalp; the second, at the ends.

First procedure:

- a. Part the hair in four sections; then into one-fourth-inch partings, from the crown to the neck.
- b. Apply the bleach with a brush or swab, starting at the scalp.
- c. The length and condition of the hair determine when the bleach should be carried to the ends.

Second procedure:

- a. The length and condition of the hair will determine how far from the scalp to start, when this procedure is used. Apply the bleach to the ends, watching the bleaching process until the bleach starts to take effect.
- b. Apply the bleach, starting at the scalp.
4. Watch the bleaching process carefully, and test for color.
5. Shampoo and dress the hair.
6. Fill out the record card.

Clean up.

1. Sterilize the equipment and place it in the cabinet sterilizer.
2. Put away supplies.
3. Put soiled towels in a covered container.
4. Clean the work table and floor.

A Bleach Touch-Up

For a bleach touch-up, the bleach should be applied to the new growth of the hair. A paste bleach is more easily controlled than a liquid bleach, and overlapping is more easily prevented. The previously bleached hair may be covered with oil, but the oil must not touch the new growth.

When mixing the paste, it is advisable not to use more than one ounce of peroxide at one time. If soap flakes are used for a carrier, add one teaspoonful to the peroxide and beat to

a froth with an egg beater. Work rapidly; the peroxide weakens in strength upon exposure to the air. This lather can be more easily removed from the hair than white henna.

Use a swab to apply the touch-up mixture: a small swab for a one-fourth-inch touch-up, and a larger one for an inch touch-up, depending, of course, upon the thickness and texture of the hair.

Sometimes more than one application of bleach is necessary to bleach new growth to match the ends of the hair.

Antiseptic Oil Bleach

An antiseptic oil is added to the peroxide and ammonia, and the mixture is applied as for a liquid or paste bleach. A commercially prepared antiseptic oil bleach may be used, or an antiseptic, other than peroxide, may be added to any oil desired for use with the bleach.

Coloring the Hair

Hair coloring or tinting is the process of changing the natural color of hair to a different shade, or of adding color to gray or white hair. Some hair dyes deposit a more or less insoluble coating on the hair shaft, while others penetrate to its inmost layers of cells.

A hair dye should never be given to a patron whose scalp is not free from eruptions or abrasions, or to one who responds positively to a patch test for hair-dye dermatitis.

There are no circumstances under which a hair dye can be guaranteed to result in a desired shade.

Coloring or tinting will not affect the natural curliness of hair unless too much softener is used, which will tend to make it dry and brittle, or will deposit so thick a coat on the shaft that the hair may lose, temporarily, its tendency to wave.

The lasting qualities of a dye depend upon the product used and the care of the hair after the tint has been given. Hot irons, permanent waving solutions, sea water, strong sunlight, free alkali of a shampoo soap, or a strong acid rinse may affect the shade. Preparations containing alcohol, such as some hair tonics, will streak and fade some dyes.

Hair dyes are classified generally as follows:

I. **Organic chemical-derivative dyes**, usually derived from aniline and called by different names, as: aniline-derivative or acid-derivative dyes, two-bottle, quick-action, instantaneous, synthetic, and peroxide dyes. Shampoo tints come under this classification. These are the most commonly used dyes.

II. **Vegetable dyes**, which deposit a coat on the hair shaft:

1. **Henna** is used as a tint, pack, or rinse, gives red tones, is harmless in effect, and can be permanently waved.

2. **Indigo** is used as a henna-indigo mixture to tone pronounced red and orange shades, is very slow in action, and is said to be toxic in effect.

3. **Wood-extracts** are used as tints, are progressive and slow, give dark brown tones, and are said to be toxic in effect.

4. **Camomile** is used as a pack or rinse, gives high lights, is harmless, and is usually used for blonde hair.

5. **Sage** is used as a rinse, gives greenish-brown tones, and discolours during permanent waving.

III. **Compound dyes**. These are combinations of metallic preparations and vegetable extracts. A compound henna is a mixture of henna, metal salts, and other dyestuffs. The metal salts are used as a mordant to fix the color. Compound dyes coat the hair, are progressive in action, are harmful, are hard to remove from the hair, and cannot be successfully permanently waved until the hair has had reconditioning treatments.

IV. **Metallic or mineral dyes**, called "color restorers." These preparations contain lead, silver, copper, and other minerals. They are progressive; they coat the hair shaft; they may be cumulative in toxic effect; they give a limited number of shades; their results are uncertain; and they cannot be successfully permanently waved without first reconditioning the hair.

Aniline-Derivative Dyes

Aniline-derivative dyes are made with a base derived from aniline, a coal tar product. An ingredient of most of these "para" dyes (paraphenylenediamine or paratoluenediamine,

both derived from aniline) has a toxic effect on some persons. Symptoms of hair-dye dermatitis range in seriousness from a headache or a rash to a swelling in a part of the body sometimes far removed from the scalp.

Aniline-derivative dyes penetrate the layers of the hair shaft, and can be applied successfully to hair of any texture if the hair is in good condition and the application skillfully made. A package containing an aniline dye will usually be made up of two dark bottles. The "A" bottle will contain the dye, and the "B" bottle the developer. Sometimes tablets are supplied in place of the "B" bottle. The developer acts as an oxidizing agent to develop the properties of the "A" liquid into a permanent color. The oxidation will continue as long as the hair remains wet. A softening agent, such as hydrogen peroxide, may be used to soften the hair before the application of the dye. Insufficient softening, or improper application of the softener, may produce an uneven tint.

Making a Patch Test

A patch test should be made before the application of a dye. The reaction of the skin to a surface application of the dye will determine whether a patron has a sensitivity to, or idiosyncrasy toward, the chemicals in the product to be used.

A patch test is usually made on the skin behind the ear or at the bend of the elbow. An area about the size of a quarter is sponged with alcohol and painted with the dye. If a two-bottle dye is to be used, equal parts of the "A" and "B" bottles are taken for the test. The area is protected by collodion which is left on for 24 hours. If no rash, swelling, or inflammation results, the patron is presumably immune, and the dye may safely be applied to the hair. This is called a "negative" reaction to the dye. If the reaction is "positive," the patron is presumably sensitive to the dye, and the dye should not be given.

Selecting the Shade

The colors of the shade card, or color chart, cannot match all hair, and it must be taken into consideration that the samples

shown are strands of white hair containing no pigment, which have been given applications of different tints.

If a color is applied to hair that contains grains of natural coloring (pigment), the result will always be a darker shade. A shade lighter than the hair must be chosen. The natural color may be found by selecting a strand of hair back of the ear or where the least number of gray hairs have appeared. For white or silver-gray hair, the patron's original hair color, or any desired color, may be selected. The texture and condition of the hair influence the selection of the shade, and as hair of the head is not of uniform color, selecting the shade for a hair tint requires judgment and experience.

When it is impossible to know the original color, as with snow-white or iron-gray hair, a shade should be selected that will harmonize with the brows, lashes, and coloring of the skin. A light shade will soften the features, while a dark one will emphasize large irregular features, wrinkles, and skin defects.

Texture and Timing

The length of time the softener or dye should remain on the hair depends upon the resistance of the hair shaft. Softeners and dyes of equal strength cannot be used for hair of all textures. Hair of one texture will absorb the softener and dye more quickly and evenly than another, and hair on some parts of the head will respond more quickly or slowly than that on other parts. All manufacturers furnish instructions for timing their products when used on fine, medium, and coarse hair. Coarse hair is usually more resistant than fine hair, although hair of coarse texture has been found to develop the shade in less time than some types of fine hair. For this reason, it is most necessary to watch the oxidizing process very closely when the tint is being applied as well as afterward. The development must be stopped as soon as the proper shade has been reached. The failure of a hair tint may be due to lack of judgment in timing as often as to the selection of the wrong shade or to other reasons.

A Test for Color

The necessity for making a test for color depends upon the condition of the hair and the shade desired. A strand should be chosen on the heavy side of the head, and the same procedure followed as for giving a complete tint.

Streaks and Discolorations

Dark streaks are caused by an over-application of dye, by overlapping when tinting virgin hair or when touching up new growth, and by improper application of the softener. Pinning and knotting tinted sections of hair too tightly will cause an uneven shade. After a tint has been applied, the hair, especially drab shades, may develop a reddish cast which may be due to too much softener, hard water and strong shampoo soap, strong sunlight, and to the action of chemicals and heat in permanent waving. Streaks may be lightened by applying peroxide, or peroxide and ammonia, and going over the damp strand with a hot iron to blend the discolored area with the tinted hair.

Rules and Precautions

1. A hair-tinting service is of strictly confidential nature. Do not discuss your patron's hair problems with others.
2. Always examine the scalp and make a patch test before giving a tint. Make a test for color if necessary.
3. Do not scratch the scalp with sharp fingernails or blister it with strong softeners or with too hot water when shampooing.
4. Do not irritate the scalp or loosen scales of dandruff by brushing and combing the hair before a tint.
5. Give the preliminary shampoo with soft water and mild soap, if a shampoo is necessary to remove oil, dandruff, and dirt, which might retard the action of the dye or affect the shade. A clean hair shaft will absorb softener and dye more quickly than a dirty one.
6. A shade added to another shade produces a darker shade. If hair is to be dyed to a lighter shade, it must first be bleached.

7. Do not use an enamel or aluminum utensil for mixing dye. Use a glass or china dish.

8. The end of a hair is older, dryer, and more absorbent than the upper part of the shaft. Full-strength dye is seldom applied to the ends, nor is dye allowed to collect there. Dye should never be applied directly to ends that are brittle and split. After the hair has been tinted, the dye remaining in the dish may be diluted with distilled water or with liquid soap, and combed through the ends.

9. To make a swab, wrap a thin piece of cotton around an orange stick, leaving no hanging ends. Press the swab against the side of the dish until it is nearly dry before using it on the hair. In most cases, the dye can be more easily controlled by a swab than by a brush.

10. Hold the hair outspread, up, and away from the scalp to prevent packing of the strand and to permit absorption of the dye.

11. Hair must be dry before the application of the softener, and usually must be dry when the tint is applied.

12. A preliminary softening may require from 20 minutes to three-quarters of an hour. Insufficient softening may cause a dye to fade, or cause an undeveloped color; some dyes are more permanent than others. Give a second application of softener to resistant hair that does not respond to the first application.

13. Hair next to the scalp is more resistant than the ends. The portion last wet by the softener is usually tinted first. However, some authorities are of the opinion that the dye should be started where the softener is first applied. The texture and condition of the hair should be taken into consideration when determining which procedure to use.

14. The softener may be started and applied wherever it seems advisable according to the grayness of the hair.

15. Keep the hair moist; the action of the dye will continue as long as it remains moist on the hair. Remove excess dye with a piece of cotton to prevent streaks.

16. A towel may be placed over the head to prevent the hair

from drying too quickly, and to hasten the oxidizing process. Watch the development carefully, and give a shampoo when the desired shade is reached.

17. To slow the action of a tint, dilute the dye with distilled water. When additional peroxide is added to a dye, the color will be lightened.

18. Stains on the skin may be removed with alcohol, hydrogen peroxide, oil, cream, or left-over dye. Dye will remove dye.

19. When giving a touch-up, be sparing with dye; do not overlap.

20. Advise the patron to keep her tinted hair in good condition with oil treatments and proper shampoos.

21. Use a moderately hot iron when waving dyed hair; heat may cause drab shades to turn red.

22. When tinting hair immediately after a permanent wave, remember that the waving process has made the hair porous; the color will develop rapidly.

23. Do not save left-over dye for future use.

24. Keep a record of every hair-tinting service. The record should show: the date, patron's name and address, name of operator, condition of the scalp, natural color of the hair, its condition and texture, whether it has been dyed or bleached, the shade selected, type of dye used, quantity and timing of the softener, timing of the shade, result of the application of the dye, time spent in giving the tint, and the price paid.

ANILINE-DERIVATIVE DYE

Supplies.

Towels and cotton

Neck strip

Rubber cape

Rubber apron

Rubber gloves

Spatulas

Comb

Dye brush or swab

Cream

Dye, with dish for mixing

Shampoo soap

Hydrogen peroxide

Ammonia

Record card

Preparing the patron.

1. As for a plain shampoo.
2. Give a shampoo without friction, with a towel dry.
3. Examine the scalp for scratches and eruptions and previous dye or bleach.
4. Apply cream to hairline.

Giving the dye.

1. Part the hair in four sections.
2. Part again in one-eighth-inch strips, starting at the back of the part in the hair.
3. Apply the softener, clockwise, over the entire head.
4. Leave on for proper time and dry with the dryer.
5. Prepare the dye:
Mix equal parts of bottles "A" and "B"; stir well.
Press the swab against the dish to remove excess dye.
6. Apply the dye *first* where the softener was last applied, to the one-eighth-inch strips. Work rapidly; cover every hair.
7. Leave on until the desired shade is reached. Watch for development of color.
8. Remove dye stains from hairline, and rinse well.
9. Shampoo lightly. A vinegar rinse may be given if desired.
10. Dress the hair.
11. Fill out dye record card.

Clean up.

1. Throw away left-over dye.
2. Put away supplies.
3. Place used towels and waste in containers.

Aniline Dye Touch-Up

A touch-up is given by applying softener and dye to the new growth only. Overlapping of the softener on the previous dye, or of the fresh dye on the old dye, will make streaks and uneven spots at the line of meeting. The softener should

usually dry naturally on the hair. The new color should be applied no closer than one-eighth of an inch from the old tint. A thin swab may be used for fine and thin hair; a thick swab for coarse and thick hair. The size of the swab also depends upon the amount of touch-up to be given. The color of dye that has been previously used on the hair must be chosen for the touch-up. The patron's record card should be checked for this information.

Hair-coloring sticks may be used in an emergency for a touch-up. They are a harmless temporary coloring in stick form and come in several shades. The color will remain on the hair until removed by a shampoo.

Dyeing Bleached Hair to Its Natural Shade

When coloring bleached hair to match new growth next to the scalp, the new growth should not be bleached, nor should it be given an application of dye. The new growth should be long enough to show clearly the natural color of the hair.

As bleached hair is very porous, caution should be exercised when using full-strength dye. The dye may be diluted with peroxide or distilled water before being carried to the ends of the hair. Water will slow the action of the dye; peroxide will lighten the color. The instructions of the manufacturer should be followed, and a test for color made on one or more small strands to determine the action of the dye.

The shade selected and the application will depend upon the condition of the bleached hair. The dye should be applied rapidly because of the porous quality of the hair, and the development watched closely, lest the hair become too dark. If the color develops too rapidly, the section of the head that is being worked on should be dried before the other sections of hair are dyed.

Shampoo Tints

Shampoo tints are made up of aniline-derivative dyes, and may contain emulsified oils which retard the action of the dye. They blend the gray hairs with the natural color, producing approximately 75 per cent coverage. Shampoo tints can be

used on hair of all textures, and on hair mixed with gray. They can also be used for dyeing bleached hair to its natural shade.

A preliminary shampoo may or may not be given, but one must be given if the hair is excessively oily and dirty. Usually, no softener is used when giving a shampoo tint.

Coloring Eyebrows and Eyelashes

A non-toxic dye must be used. A non-toxic dye may be applied to the **eyebrows** in the form of liquid or paste. The patron should be protected by an application of vaseline or cream above and below the browline to prevent the dye from staining the skin. If an arch is to be given with an eyebrow dye, *the dye must be completed first.* Precaution should be taken when dyeing the **eyelashes** to protect the skin below and above the lashes by cream or vaseline. A crescent-shaped paper or dampened cotton over the eyelids and under the lower lashes must always be used. The instructions of the dye manufacturer must be carefully followed, and caution taken in selecting the shade.

Vegetable Colorings

The vegetable coloring most commonly used is henna, which is made from the dried stems and leaves of a shrub. The importance of using a first-grade henna cannot be overemphasized. Only a standard preparation should be used. A paste made from pure powdered henna will not harm the hair. Only pure henna can be successfully permanently waved, finger waved, or marcelled. When hennaed hair is marcelled, the iron should not be too hot.

The only shade obtained from henna is red. The shade of red obtained depends upon the basic shade of the hair to which it is applied. By adding cloves, cinnamon, bluing, copperas, hydrogen peroxide, or ammonia, lighter or darker shades can be produced. Cloves are the most effective spice to use in toning down a carrot shade. One teaspoonful of cloves is used with one tablespoonful of henna. While a coating on the hair shaft will dull its luster, the appearance of the hair may

be improved by a henna pack, which will give auburn highlights and copper glints to some shades of hair and a warm tone to drab, mouse-colored hair. An application of henna to white hair will produce a peculiar orange-red tint.

Henna is applied to the hair in the form of a warm paste. It should be mixed in an earthen or unchipped enamel dish, to avoid the action of metal on the henna, and should be stirred with a wooden spoon. The henna container should be kept tightly closed; moisture will affect the henna powder. The back portions of the head are usually treated first, as the hair is more resistant there. The paste should be applied rapidly so that an even shade will develop on all parts of the head, and must be applied evenly to prevent streaks due to overlapping. The shade produced will depend upon the strength of the henna mixture, the skill of the operator, the length of time the pack is left on the hair, and the basic shade of the hair. Peroxide may be added to lighten the shade, and cloves or bluing added to darken it.

A test should be made during the developing of the shade by sponging a small strand of hair with cotton wet with warm water. Sometimes two or three tests must be made before a satisfactory color shows on the hair.

If the henna is given to fine hair for body only (not color), then give the henna pack before the permanent wave. If the henna pack is given for color only, then give the permanent wave first. When henna packs are given for color only, it is not advisable to give a henna pack and a permanent wave the same day, as the henna pack has a tendency to weaken the permanent wave.

Spices added to the pack may react unfavorably to the permanent waving process and cause dark streaks and stains. A test curl must always be given before waving hennaed hair.

Hennaed hair is more or less harsh and dry. The patron whose hair has been hennaed should be advised to have regular scalp or reconditioning treatments in the shop.

HENNA PACK**Supplies.**

Towels	Night cream or massage oil
Wax paper to cover hair	Shampoo soap
Rubber cape and chair cloth	Henna powder
Rubber gloves and apron	Double boiler and wooden spoon
Neck strip	Brush and cotton
Brush and comb	Record card

Preparing the patron.

1. Place the neck strip, chair cloth, and rubber cape.
2. Cream the hairline.

Giving the henna pack.

1. Wet the hair. (The pack may be applied to dry hair.)
2. Part the hair into four equal sections.
3. Mix the henna paste.
4. Apply the paste to strands of hair with a brush.
5. Cover the head with wax paper or steam towels.
6. Leave on until the desired shade is reached.
7. Rinse the paste from the hair with warm water.
8. Give a shampoo; give an acid rinse if desired.
9. Dress the hair.
10. Make out dye record card.

Clean up.

1. Put away supplies.
2. Sterilize equipment and place in the cabinet sterilizer.
3. Clean the work table and floor.

Henna Pack Touch-Up

A henna pack touch-up is given in the same manner as a virgin henna pack, except that the pack is applied to the new growth only, until the desired shade is obtained. The paste may then be diluted with warm water and applied to the remainder of the hair for further brightening, or the paste of the touch-up may be rinsed off and a thorough shampoo given.

Reconditioning Treatments

Reconditioning treatments are given for the purpose of keeping dyed or bleached hair in good condition and to prepare hair to receive a bleach or tint. Successful hair tinting depends upon the health of the hair.

Virgin hair, if dry and brittle, cannot be expected to acquire, through the tinting process, elasticity and gloss. A series of reconditioning treatments should be given to dry and brittle hair before a tint. The oil applied in such treatments should be kept warm by covering the hair with steam towels or by using a therapeutic light or steamer. Or, the oiled hair may be lifted strand by strand between the prongs of a marcel iron and the iron moved along its length. The last-named method keeps the oil warm without affecting the scalp.

Bleached hair is inclined to be more or less dry, brittle, porous, and lusterless. Oil treatments should be given frequently to keep the hair in the best condition possible, and should be given before tinting bleached hair to its natural shade.

Dyed hair that has been injured by dyes, that is streaked and discolored, or that is heavily coated by continued applications of compound, metallic, or vegetable dye can be improved by reconditioning treatments, which should be continued until the hair is in good condition.

Egyptian henna yields readily to hot oil applications, as the oil softens the coating on the hair. Compound hennas and mineral dyes are removed only by skillful and prolonged reconditioning. The treatments should be continued for some time before a new tint is applied to the hair.

Removing Dye from Hair

While there is no safe, quick process for removing dye without injury to the hair, hot oil treatments will prepare the hair for a fresh tint.

Before using a dye remover, the operator should know the nature of the preparation that has been applied to the hair. The dye remover to be used for an acid dye or Egyptian henna

will differ from the one selected for a compound henna or a metallic dye.

A standard dye remover may be used. It will soften a coating on the hair shaft, and, while all the color that has penetrated the hair cannot be removed, the hair can be put into condition to react with reasonable success to a fresh dye. The application of a dye, however, and the process of its removal will usually make hair porous, and it will absorb a fresh tint quickly.

A test to determine the action of the remover should be made after a preliminary shampoo. Apply the remover to a small portion of a strand on the heavy side of the head. If the test shows that the remover will not injure the hair and will remove the dye, the remover may safely be applied to the entire head.

Part the hair into half-inch sections and apply the remover according to the instructions of the manufacturer. Do not use the remover on new growth next to the scalp. Give an additional application to dark strands, to streaks due to overlapping, and to spots around the front hairline.

Place the patron under the steamer and watch carefully the action of the remover. The time under the steamer will depend upon the amount of dye to be removed and the resistance of the hair. The time may vary from five minutes to nearly an hour. Give a shampoo, without brushing or massage, and rinse and dry the hair. If another application of the remover is necessary, repeat the process. The manufacturer's instructions must be carefully followed when a dye remover is used.

Questions

1. What should an operator know in order to bleach or color hair?
2. What is meant by virgin hair?
3. What abilities should an operator possess to bleach and tint hair successfully?
4. What is meant by bleaching hair?
5. What is the function of a bleaching agent?

6. How is the pigment of the hair affected by the bleaching agent?
7. How does a bleach affect the hair structure?
8. How does bleaching affect the color of the hair?
9. What shades may be obtained by bleaching hair?
10. Can a bleach be guaranteed?
11. Will bleaching injure normal hair?
12. Does bleaching affect natural curliness?
13. What is the effect of continued bleaching on hair?
14. In what forms are bleaches applied?
15. Of what does a liquid bleach usually consist?
16. What is meant by a carrier of a bleach?
17. How is a paste bleach made?
18. Name two carriers used for paste bleaches.
19. What is white henna?
20. What chemical solution is generally used for bleaching hair?
21. How does peroxide affect the texture and color of hair?
22. In what strengths is peroxide used for bleaching purposes?
23. Why should a solution weaker than 17 volume not be used?
24. By what means may the action of peroxide be quickened?
25. How long will the action of the peroxide continue on the hair?
26. How may the action of the peroxide be retarded?
27. What kind of ammonia is used for bleaching purposes?
28. What determines the quantity of ammonia to be added to the peroxide?
29. What quantity of ammonia can generally be used without giving a reddish cast to the hair?
30. Why should bleaching treatments be considered confidential?
31. Why should the bleach not come in contact with the skin?
32. Upon what does the strength of the bleaching formula depend?

33. What is the appearance of overbleached hair?
34. What are the principal causes of overbleaching?
35. Why should the bleach mixture not be exposed too long to the air?
36. Why should the peroxide be fresh?
37. Should a shampoo always be given before a bleach?
38. Why should the scalp not be irritated before bleaching the hair?
39. Should an acid rinse be given before a bleach?
40. Why is it necessary to work rapidly while bleaching the hair?
41. What part of the hair is usually most resistant to the bleach?
42. What is meant by hair that is resistant to the bleach?
43. Why should the swab be nearly dry?
44. How may overlapping be prevented when using a swab?
45. Why does it take more time to bleach oily hair than dry hair?
46. How may the bleach be kept from drying too rapidly?
47. At what point is the shampoo given after a bleach?
48. How would you advise a patron to care for her bleached hair?
49. Describe the process of giving a virgin bleach.
50. Describe the two procedures used in applying the bleach.
51. To what part of the hair is the bleach applied for a bleach touch-up?
52. How may overlapping be prevented when giving a bleach touch-up?
53. How are soap flakes prepared for use as a touch-up paste?
54. Upon what does the thickness of the swab for a touch-up depend?
55. What is an antiseptic oil bleach? How may it be prepared?
56. What is mean by hair coloring?
57. In what different ways do dyes color the hair?
58. Should a hair dye be given to a patron who has any eruption or abrasion on the scalp?

59. Under what circumstances can a hair dye be guaranteed to result in a desired shade?
60. Will dyeing the hair affect its natural waviness?
61. Upon what factors does the lasting qualities of a dye depend?
62. Name some agencies by which the shade of a dye may be affected.
63. How do tonics containing alcohol affect dyed hair?
64. How are hair dyes classified?
65. By what different names are organic chemical-derivative dyes called?
66. Under what classification do shampoo tints come?
67. Name some kinds of vegetable colorings.
68. What is the principal difference between a vegetable coloring and an acid-derivative dye?
69. What is a henna-indigo dye? What shades are produced?
70. What are the disadvantages of wood-extract dyes?
71. How is camomile used to color the hair?
72. What is a compound dye?
73. What is a compound henna dye?
74. For what purpose is a mordant used?
75. What is the action of a compound dye on the hair shaft?
76. Can compound dyes be successfully permanently waved?
77. What is a "color restorer"?
78. What minerals do metallic dyes contain?
79. What are the disadvantages of mineral dyes?
80. What is a progressive dye? What is meant by "cumulative effect"?
81. How are aniline-derivative dyes made?
82. What is meant by a "para" dye?
83. What are some of the symptoms of a hair-dye dermatitis?
84. What is the action of an aniline-derivative dye on the hair shaft?
85. Are aniline-derivative dyes permanent?

86. Can aniline-derivative dyes be applied to hair of all textures?

87. How is a package of an aniline-derivative dye usually made up?

88. What does the "A" bottle contain? The "B" bottle?

89. What is the action of the developer? How long will the oxidation continue to take place?

90. What will be the result of insufficient softening of the hair?

91. What precaution should be taken before applying a dye?

92. What is meant by a sensitivity to a product? What is an idiosyncrasy?

93. How is a patch test made?

94. How long a time should elapse before examining the patch?

95. How will the skin appear if the reaction to the test is positive?

96. What is meant by a negative reaction to a dye?

97. How are the samples on the color chart prepared?

98. If a dye is applied to hair which already contains pigment, what will be the result?

99. How may the natural color of the hair usually be determined?

100. How should the shade be selected?

101. Should the shade selected be lighter than the patron's hair?

102. What factors should influence the selection of the shade?

103. How would you select a shade for snow-white or iron-gray hair?

104. Upon what principal factor does the time the softener should remain on the hair depend?

105. Why can softeners and dyes of one strength not be used on hair of all textures?

106. Which is usually most resistant to a dye, coarse or fine hair?

107. Why is it necessary to watch the oxidizing process carefully?

108. When should the development of a dye be stopped?

109. Give some reasons for the failure of a hair tint.

110. How is a test for color made? When is this test necessary?

111. What are the general causes of dark streaks in dyed hair?
112. Why should the hair not be knotted and pinned tightly during a hair dye?
113. Give some reasons for the development of a reddish cast to the hair after a dye has been applied.
114. How may streaks in dyed hair be lightened?
115. Why should a hair tinting service be of a confidential nature?
116. Why should the scalp be examined before a hair dye is given?
117. Why is it advisable not to irritate the scalp before giving a hair dye?
118. Under what circumstances should a shampoo be given before a dye?
119. Can dark hair be dyed to a lighter shade?
120. What kind of dish should be used in mixing hair dye?
121. In what respects is the end of the hair shaft different from the part next to the scalp?
122. Should full-strength dye be applied to the ends of the hair?
123. How should the dye be applied to the ends of the hair?
124. How is a hair-dye swab made? How should it be used?
125. Why is a swab more satisfactory than a brush?
126. How should the hair be held? Why is it good practice to hold the hair away from the scalp during the application of a dye?
127. Should the hair be wet or dry when the softener is applied?
128. Should the hair be dry when the dye is applied?
129. What are the probable results of insufficient softening of the hair?
130. Which portion of the hair is usually treated first after the softener has been applied?
131. What factors must be taken into consideration when applying the dye, after softening the hair?
132. How long will the action of the dye continue?
133. How may excess dye be removed to prevent streaks?

134. How would you prevent the hair from drying too quickly?
135. What is the first thing to do when the desired shade is reached?
136. How would you slow the action of a tint?
137. How may the color of the dye be lightened?
138. By what means may hair-dye stains on the skin be removed?
139. How would you advise a patron to care for her hair after a dye?
140. What is the effect of hot irons on dyed hair?
141. Why will a hair tint develop more rapidly when given immediately after a permanent wave?
142. Should left-over dye be used on another patron's hair?
143. What information should a hair dye record card show?
144. Briefly describe the process of an aniline-derivative dye.
145. What is an aniline dye touch-up?
146. To what part of the hair is a touch-up given?
147. How may streaks and uneven spots be made during a touch-up?
148. How near to the old tint should the dye be applied?
149. What color of dye should be chosen for the touch-up?
150. What is a hair-coloring stick? For what purpose is it used?
151. When dyeing bleached hair to its natural shade, should the new growth be bleached and dyed?
152. What precaution must be used when dyeing bleached hair?
153. Why will a dye develop more rapidly on bleached hair than on virgin hair?
154. What are shampoo tints? What is their action on gray hair?
155. Can shampoo tints be used on hair of all textures? Are shampoo tints permanent colorings?
156. When should a shampoo be given before a shampoo tint?
157. Why should a non-toxic dye be used when coloring eyebrows and lashes?

158. How should a patron be protected during an eyebrow or eyelash tint?

159. If an arch is to be given, why should the dye be given first?

160. What precaution should be taken when dyeing the eyelashes?

161. What is the vegetable coloring most commonly used?

162. How is henna powder made? In what form is it applied to the hair?

163. Will henna injure the hair? Can hennaed hair be successfully permanently waved?

164. Should a very hot marcel iron be used on hennaed hair?

165. What shade is obtained from applying henna to the hair?

166. How may the shade be made lighter or darker?

167. How would you tone down a carrot shade in hennaed hair?

168. What is the effect of henna on drab and mouse-colored hair?

169. Will henna successfully color white hair or gray hair?

170. How should henna be applied to the hair?

171. What kind of dish and spoon should be used when mixing henna paste?

172. Why should a henna pack be applied rapidly and evenly?

173. What effect on the shade will the addition of peroxide produce?

174. What effect will the addition of bluing or cloves have on the shade?

175. How is a color test made when applying henna to the hair?

176. Why is a henna pack sometimes given to fine hair before a permanent wave?

177. What effect will the addition of spices to henna be likely to have on a permanent wave?

178. How would you advise a patron to care for her hair after a henna pack?

179. Briefly describe the process of a henna pack.

180. How are the hairline and ears protected during a henna pack?

181. How is a henna pack touch-up given?

182. How is the henna paste diluted for the ends of the hair?
183. For what purposes are reconditioning treatments given?
184. Upon what physical factor does the success of a hair tint depend?
185. How should dry and brittle hair be prepared for a tint?
186. How may the oil be kept warm on the hair?
187. Why are reconditioning treatments beneficial to bleached hair?
188. What is the appearance of hair that has been injured by incorrect application or by inferior dyes?
189. How long should reconditioning treatments be continued for dyed hair?
190. Will reconditioning treatments remove henna from hair?
191. What is the effect of hot oil on the henna coating on the hair?
192. How do compound henna and metallic dyes usually respond to reconditioning treatments?
193. Should a hot oil treatment be given immediately before a tint?
194. Is there any safe, quick process for removing dye from the hair?
195. Why should the same dye remover not be used for all conditions of hair?
196. What is the action of a dye remover on the hair?
197. Before applying a dye remover, how should a test be made, and what should the test show?
198. How is a dye remover applied to the hair?
199. Should the dye remover be applied to new growth?
200. When removing dye from hair, upon what should the time under the steamer depend?

Chapter XX

MANICURING

Manicuring, from *manus*, hand, and *cura*, care, is the process of caring for the hands and nails. A manicure is given as a sanitary measure to preserve the normal healthy condition of the hands and nails, and to emphasize and retain their inherent shape and beauty.

To maintain a standard of expert manicuring service in the shop, an operator should have a knowledge of: sterilization and sanitation, and the laws regarding their practice when working on body tissues; the dangers of infection; diseases of the skin; abnormal conditions of the nails; structure of the arms, hands, and nails; the chemical composition of the nails; factors affecting the health and growth of the nails; instruments used in manicuring and their proper use and care; effect of methods of sterilization on instruments; effects of soap and water, oil, massage, and therapeutic lights on the skin and nails; composition of the products used in manicuring and their effects on the skin and nails; and the correct shaping and make-up of the nails for hands of different shapes and sizes.

The operator should have the ability: to sterilize instruments and use safety precautions to prevent injury or infection; to place her instruments for a table or booth manicure; to shape, cleanse, bleach, buff, and apply polish to the nails; to soften and remove dead cuticle without injury to the surrounding tissues; to give a hand and arm massage; to use oil, steam pads, and the therapeutic light correctly; to keep cutting instruments sharp, and to keep all tools free from rust, clean, and in good order; and to use both sharp and blunt instruments carefully.

A sterile manicure is the only kind a shop can afford to

offer its patrons. This means complete asepsis, before every manicure, of the hands of the operator and of every article and instrument used in the process. The operator must realize the seriousness of the sterilization routine given in Chapter XI, "Sterilization and Sanitation."

The hands, because of their constant use, are more exposed to infection than other parts of the body. If a finger is pricked or cut during a manicure, an infection may occur. The skin around the nails of the patron should be made surgically clean. A manicure should not be given if even the smallest sign of infection is present in the area surrounding a nail.

The hands of the operator should be perfectly groomed, as this will give the patron confidence in her ability to use all safety precautions and to give a successful manicure.

The Health of the Nails

A normally healthy nail should be of a light pink color with a natural polish or gloss. The nail is an appendage of the skin, and is subject to the influence of certain diseases of the skin. The sensitive nail root may be injured by accident or disease, and the luster and natural contour of the nail may be permanently affected.

Dry and brittle nails may be caused by a constitutional disorder, or the fat in the keratin of the nails may be affected by strong soaps, the harsh ingredients of inferior nail polishes and enamels, chemicals used for certain business purposes, and so forth. Oil treatments and massage will be beneficial.

A hangnail, or agnail, is a shred of dry, hard cuticle which has broken away from the side of the nail. The cuticle should be softened with warm oil, and the hangnail clipped with sterilized nippers or scissors. An antiseptic should then be applied with sterile cotton. Sterile tweezers may be used to lift the hangnail so that it may be clipped close to the nail.

An ingrowing nail is one whose edges grow in the adjacent flesh. If inflammation is present, the nail should not be lifted and clipped.

Uneven growth of the nails may cause corrugations or

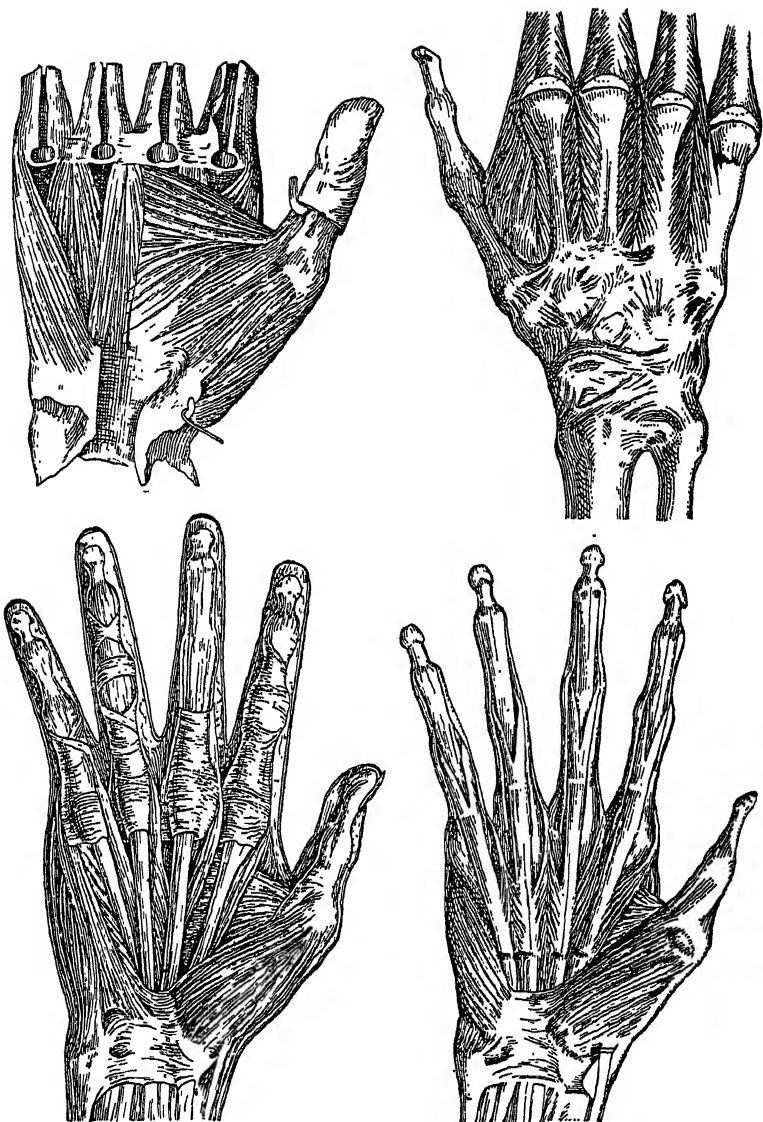


FIG. 24.* THE MUSCLES AND TENDONS OF THE HUMAN HAND
DISSECTED AT FOUR DIFFERENT LEVELS. (*From Spalteholtz.*)

* From *Ascaris, the Biologist's Story of Life*, by Richard Goldschmidt, New York, Prentice-Hall, Inc., 1937, page 107.

ridges, which may be polished with powdered pumice to improve the appearance of the nail.

White spots are caused principally by careless manicuring. The sensitive matrix of the nail has received too much pressure or has been bruised in the pushing back of the cuticle.

Blue nails and **clubbed** or otherwise deformed nails are caused by constitutional diseases. Manicuring cannot improve the appearance of a discolored or deformed nail to any great extent.

Nail biting (onychophagy). Victims of this habit bite the free edge of the nail and gnaw the cuticle at the base of the nail. The dry, hardened cuticle adhering to the surface of the nail is said to affect the cutaneous nerves, and to relieve the condition the cuticle is gnawed and torn away. Frequent manicures with warm oil will keep the cuticle free from the nail and the free edge smooth, and so should help to overcome the habit.

Rules and Precautions

1. Wash your hands with hot water and soap, rinse, dip into a sterilizing solution, and dry with a sterile towel *before* and *after* every manicure.

2. Keep sterilized instruments in the cabinet sterilizer until ready for use. Keep buffer chamois and emery boards in the cabinet sterilizer.

3. Keep the orangewood stick, pusher, nippers, and scissors in the jar of sterilizing solution during the manicure, and dip them in the solution after working on a finger. Change the solution regularly.

4. Dip the orange stick in the sterilizing solution after working on the cuticle of a finger.

5. Do not drop tools to the floor.

6. Apply an antiseptic immediately to a prick or cut made during a manicure.

7. Treat a slight hemorrhage by applying an antiseptic followed by a liquid or powder styptic.

8. Do not use a therapeutic light closer than 18 inches from the skin

9. Two sets of instruments for each table are indispensable, especially in a busy shop.

10. **Removing enamel polish.** Two applications of the remover may be necessary.

11. **The shape of the nail** should be determined by the contour of the hand, the length of the finger, the shape of the tip, and the occupation of the patron, unless the patron expresses preference for an exaggerated style. An oval tip is the most practical for nearly all hands; a short oval tip will break the length of a long, thin hand. Rounded tips will slenderize long, broad hands, and oval tips of medium length will be least conspicuous for short, broad hands with stubby fingers.

12. **Men** usually desire a conservative manicure. Use the emery board instead of a file, unless the length is to be considerably shortened. Powder polish is usually preferred by men to enamel.

13. **Filing the nails.** Use a steel file when a length of nail is to be shortened. Use pressure only on the downward stroke; file from the side toward the center. Deep filing into the corners weakens the nail plate and may cause discomfort and, if the skin is bruised, an infection. Use the coarse side of the emery board for shaping the nails in almost all cases, and the fine side for smoothing and finishing the edge. The emery board is best for nail corners; it will not make too deep a cut. Use the emery board for smoothing the nail after a steel file has been used.

14. **Softening the cuticle.** The cuticle should be made soft and pliable by the soap bath and the softener, so that it can be loosened gently and pushed back from the nail.

15. **Overlapping cuticle.** The cuticle should never be cut except in cases of excess growth and at the request of the patron. All dry and ragged edges, however, must be removed. Extreme caution must be used when removing the cuticle. The most delicate and sensitive part of the nail is being worked on; pressure must not be used. The matrix is easily injured; ridges and white spots are the result of careless work on the cuticle.

16. **Cleansing under the free edge.** Too much pressure with the orange stick will roughen or break the skin under the free edge, and dirt will collect there. Never use a sharp instrument for this process.

17. **Apply nail bleach** under the free edge after the nail has been cleansed, and remove it at the finish of the manicure. For stains under the free edge, apply the bleach early in the manicuring process.

18. Use the **buffer** with long, even strokes toward the tip of the nail. The buffing will stimulate the circulation of blood beneath the nail, smooth the nail for the enamel polish, and give a high gloss after dry, liquid, or paste polish has been applied. Do not buff with pressure or for too long a time. Lift the buffer from the surface of the nail after each stroke to prevent overheating. Do not buff the skin around the edges of the nail.

19. **Nail polishes** are of four kinds: powder, paste, liquid, and nail enamel. Apply powder, liquid, and paste polishes with the tip of the finger, and buff the nail. Apply nail enamel lengthwise of the nail by means of a fine brush. The polish should flow evenly; do not have too much enamel on the brush; keep the brush smooth and clean by using polish remover. Buffing will prepare the nail for the polish; the nail should be as smooth as glass. Wash the nails after the buffing. If the oil used in manicuring has not been entirely removed, the polishing will not be a success.

20. **Pumice powder** may be used on the buffer to smooth the nail and remove stains.

21. Remove stains from the nail plate and underneath the free edge by applying lemon juice, hydrogen peroxide, or a prepared bleach. For the deeper stains, pumice may be used.

22. The time required to give a manicure depends upon the speed of the operator and the condition of the patron's nails. Some manicures may be given in twenty minutes. Others, where closely-adhering and overlapping cuticle or other nail conditions slow up the process, may require from thirty to forty minutes. There should be no appearance of haste.

23. Give a hand massage at the finish of the manicure to

relax the muscles and tendons of the wrist and hand, and apply a good hand cream or lotion.

24. The four most important steps in manicuring are:

- (1) Sterilizing the instruments.
- (2) Shaping the nails.
- (3) Conditioning the nails.
- (4) Applying the polish.

25. Brittle nails may be improved by massage with oil or cream to stimulate the circulation of blood to the matrix of the nail. Brittle nails may be strengthened by being allowed to grow out at the corners and by being shaped more squarely to prevent breaking or splitting.

26. To patch a split nail, apply thin adhesive tape or court plaster and cover with enamel nail polish.

Instruments for Manicuring

1. Steel file to shape the nails.
2. Emery board to smooth the nail edge.
3. Orangewood stick to apply solvent or softener and oil or cream to the cuticle, and to cleanse and apply nail bleach under the free edge.
4. Cuticle knife or pusher to push back the cuticle.
5. Cuticle scissors or nippers to remove ragged edges and hangnails.
6. Buffer for polishing the nails.

WATER MANICURE

Supplies.¹

Towels	Manicuring instruments
Soap bath	and supplies
Cotton pledgets	Hand rest
Jar for wet sterilizing solution	Hand cream or lotion

¹Supplies that come in direct contact with the patron in this and every other manipulative procedure must be sterile.

Preparing the table.

1. Cover the hand rest with a smooth towel.
2. Adjust the table lamp.
3. Wash and sterilize your hands.
4. Arrange instruments and supplies on the table and in the sterilizing solution.

Preparing the patron.

1. Seat the patron.
2. Examine the nails for blemishes, infections, and nail peculiarities.
3. Consult the patron as to nail styling and polish.

Giving the manicure.

1. Remove polish from nails of both hands.
2. File right hand and place in soap bath to soak.
3. File left hand. Do not place in soap bath until finished with the middle finger of the right hand.
4. Remove right hand from bath and dry.
5. Apply softener to the cuticle.
6. Apply liquid bleach under the free edge of the nails.
7. Loosen the cuticle, beginning with the little finger.
8. Push back the cuticle and remove the surplus. Keep the cuticle moist by dipping the orange stick or pusher into the soap bath.
9. Wipe the fingers with the ends of the towel that covers the hand rest.
10. Use the emery board to smooth rough edges.
11. Apply nail white under free edge of each nail.
12. Repeat the process for the left hand.
13. Rinse both hands with clear water.
14. Buff the nails with paste, liquid, or powder polish (optional).
15. Apply enamel polish. Remove excess polish with tissue.
16. Apply hand cream or lotion, and massage.

Clean up.

1. Sterilize instruments and place in cabinet sterilizer.
2. Put away supplies.

3. Wipe off table and stool.
4. Wash and sterilize your hands.

Hot Oil Manicure

A hot oil manicure is given to hands with ridged and brittle nails, overdry cuticle that has been neglected and adheres to the nail, and calluses, and to hands that show evidence of hard work. The oil softens the cuticle, making it more easily conditioned. A hot oil manicure is given in the same manner as a water manicure to the point of completing the conditioning of both hands. Each finger is then wrapped with a cotton pledget saturated with warm oil, and the hands are placed under a therapeutic light for five minutes. The oil may be heated and the fingers dipped into the oil, instead of using oil pledgets. Containers may be purchased that will keep the oil at an even temperature. Each finger should be massaged and the manicure completed as for a water manicure.

Oil Manicure

An oil manicure differs from a hot oil manicure in that the conditioning of the cuticle is done over oil. An oil manicure is usually given with a product manufactured especially for this purpose.

Electric Manicure

The manicuring machine includes an emery wheel to be used in place of a file and emery board, a cuticle brush in place of a pusher or knife, and an electric buffer. The manicure is given as for a water or oil manicure. If an electric manicuring machine is used, the operator should have had a demonstration by the manufacturer, and should follow instructions carefully.

HAND MASSAGE

1. Place the patron's hand, palm down, in your left hand. Apply hand cream with your right hand.
2. With both thumbs rotate the back of the hand from the

knuckles to wrist, rotating firmly on the knuckles. Repeat three times.

3. Massage each finger, pausing to rotate on each joint. Repeat three times.
4. Point the finger by sliding the thumb and forefinger toward the tip. Repeat three times.
5. Hold the finger tip firmly; raise, pull, and rotate each finger. Repeat three times.
6. Thumbs on wrist. Smooth out the wrinkles of the wrist by rotating with the cushions of the thumbs.
7. Complete the massage by patting the back of the hand.
8. Remove cream and apply hand lotion, if desired.
9. Dust with talcum powder sparingly (optional).

HAND AND ARM MASSAGE AND BLEACH WITH MANICURE

Supplies.

As for a plain manicure.

Add: Towels

Tissue strip

Spatulas

Cleansing and night cream or massage oil

Bleach cream or paste

Astringent lotion

Powder

Preparing the patron.

1. Sterilize your hands.
2. Place tissue strip and towel above elbow.
3. Protect patron's clothing.

Giving the massage, bleach, and manicure.

1. Cleanse arms with cleansing cream; remove cream.
2. Apply night cream or massage oil.
3. Give massage:
 - a. Rotary movements in the form of the letter S from elbow to wrist in three positions, starting from the elbow on the inside of the arm. Slide back to the elbow

after each movement is completed. Repeat three times.

- b. Kneading movements from elbow to wrist in three positions, starting from the elbow on the inside of the arm. Slide back to the elbow after each movement is completed. Repeat three times.
 - c. Tapping movement from elbow to wrist in three positions, starting from the elbow on the inside of the arm. Slide back to the elbow after each movement is completed. Repeat three times.
 - d. Rotary movements in the form of the letter S around the wrist. Repeat three times.
 - e. Rotary movements in the form of the letter S from the wrist over the metacarpals to the third phalange. Slide back to the wrist after each movement is completed.
 - f. Rotate elbow joint three times.
 - g. Rotate each finger three times and flex.
 - h. Rotate wrist three times and flex.
4. Remove night cream or massage oil.
 5. Apply bleach to both arms and backs of hands to the last phalange of each finger.
 6. Give a manicure down to the application of the polish.
 7. Remove the bleach by sponging with warm water.
 8. Apply astringent lotion to arms and hands, and powder.
 9. Polish the nails.

Clean up.

1. Put away supplies.
2. Place used towels and waste in covered containers.
3. Wipe off table and chair.
4. Wash and sterilize your hands.

PLAIN PEDICURE

Supplies.

Antiseptic solution	Steam towels
Jar of sterilizing solution	Cotton pledgets
Toenail nippers	Emery board

Buffer	Cuticle oil
Brush	Nail white
Orangewood stick	Nail polish
Cleansing cream	Cuticle softener
Night cream or massage oil	Large bowl for warm, soapy
Skin-toning lotion	water and one for clear
Foot powder	water

Preparing the patron.

Remove her shoes and hose. Wash and sterilize your hands. Fold a towel over the hem of the patron's dress and lift her dress up to her knees. Place a towel under her foot and leg. Examine her nails for blemishes and infections, and decide upon the polish.

Giving the pedicure.

1. Sponge the feet and legs with a mild antiseptic solution and wipe dry.
2. Cleanse the foot and leg to the knee with cleansing cream, remove, and apply night cream or massage oil.
3. Massage from the ankle to the knee, with rotary movements, giving deep manipulations on the muscles of the calf to relieve fatigue. Massage ankle and ball of foot.
4. Remove the cream with hot, wet towels.
5. File the nails of the left foot, rounding them slightly. Apply cuticle softener with a cotton-wrapped orange stick. Remove cotton and place in waste container. Return the stick to the sterilizing solution. Apply nail white under the free edge of each nail, using fresh cotton for the stick and placing it in the waste container when used. Wrap the foot in a hot, wet towel. Proceed with the right foot.
6. Remove the towel from the left foot and wipe dry. Push back the cuticle; remove dead cuticle and ragged edges, using the same sanitary precautions with the orange stick and returning the nippers to the sterilizing solution after being used. Apply cuticle oil with a cotton-wrapped stick; remove the cotton and return the

stick to the sterilizing solution. Proceed to condition the right foot.

7. Apply night cream or massage oil, and give foot massage.
 - a. With both thumbs, rotate with pressure from the ankle across the instep to the toes. Repeat three times.
 - b. Massage the toes. Repeat several times on each toe.
 - c. Lift the foot, and rotate across the ball to the heel. Repeat three times.
8. Remove excess cream and nail white with warm, soapy water and a brush.
9. Apply skin-toning lotion to the legs and feet. Buff each nail with three strokes. Apply nail polish. If enamel polish is to be used, insert cotton between the toes.
10. Dust with foot powder.
11. Assist the patron with her hose and shoes.

Clean up.

1. Sterilize instruments and place in the cabinet sterilizer.
2. Put away supplies; place used towels and waste in covered containers.
3. Wash and sterilize your hands.

Questions

1. What is manicuring?
2. For what purpose is a manicure given?
3. Why is a manicure a sanitary measure?
4. For efficient manicuring, what knowledge should an operator possess?
5. What abilities should an operator have to give a proper manicure?
6. Why should strict sanitary measures be practiced when manicuring the nails?
7. What is meant by a sterile manicure?
8. Why is sterilization important when working on body structures?
9. Should instruments be sterilized after a manicure?

10. What parts of the body are most exposed to infection?
11. When may an infection occur during a manicure?
12. Should a manicure be given to an infected finger?
13. Why should the hands of the operator be perfectly groomed?
14. What is the appearance of a healthy nail?
15. How is the nail affected generally by injury or disease?
16. What are some of the causes of dry and brittle nails? What treatments should be given for dry and brittle nails?
17. Name some ways in which the fat in the keratin of the nails may be affected.
18. What is a hangnail?
19. How should you remove a hangnail?
20. What is an ingrowing nail?
21. What is a probable cause of ridged or corrugated nails?
22. How may ridges in the nails be treated?
23. How are white spots caused during manicuring of the nails?
24. What is the general cause of blue nails or clubbed nails?
25. What is the scientific term for nail biting?
26. What is a probable cause of onychophagy?
27. What treatments should be given for onychophagy?
28. What is the first important step in giving a manicure?
29. How would you sterilize your hands?
30. Where should the manicuring instruments be kept until ready for use?
31. Where should the orange stick and scissors or nippers be kept during the manicure?
32. Why should the sterilizing solution be changed regularly?
33. What sanitary precaution should be observed when working on the cuticle with an orange stick?
34. What action would you take if a cut were made during a manicure?
35. How would you treat a slight hemorrhage?
36. How close to the skin should a therapeutic light be used?

37. Why are two sets of instruments for each table necessary?
38. How is enamel polish removed from the nails?
39. When should a steel file be used?
40. What is the proper method of filing the nails?
41. What precautions should be used when filing the corners?
42. How may deep filing of a nail cause an infection?
43. When should the coarse side of the emery board be used?
44. When should the fine side be used?
45. Why is the emery board best for corners?
46. How should the cuticle be softened?
47. Should pressure be used in pushing back the cuticle?
48. Should the cuticle ever be cut?
49. Why is it necessary to have the consent of the patron when cutting the cuticle?
50. What care should be taken when removing dead cuticle?
51. What may be the consequences of careless work on the cuticle?
52. What delicate part of the nail lies beneath the cuticle?
53. Why should the free edge be carefully cleansed?
54. Why should a sharp instrument not be used under the free edge?
55. At what point in the process is nail white applied?
56. Should nail white or bleach be removed before the manicure is completed?
57. How should the buffer be used?
58. In what way may the buffer cause the nail to be overheated?
59. For what purpose is pumice powder used?
60. Name the different kinds of nail polishes.
61. How are liquid, paste, and powder polishes applied?
62. How should the nails be prepared for the enamel polish?
63. How should enamel polish be applied?
64. Should the nails be washed after the buffing?

65. Will oil on the nails affect the smoothness of the polish?
66. Name three ways to remove stains from the nails.
67. What is the average length of time required to give a proper manicure, and upon what does the time depend?
68. Why should there be no appearance of haste, and why is there any danger of infection in haste?
69. How should the shape of the nails be determined?
70. How may a split nail be patched?
71. For what purpose is a hand massage given after a manicure?
72. What are the most important steps in the manicuring process?
73. Name the instruments used in manicuring.
74. Name the supplies necessary for giving a manicure.
75. How is a patron prepared for a manicure?
76. How should jars and bottles be kept?
77. Why should the patron's hands be examined before giving her a manicure?
78. Should the soap bath be made of cold water?
79. What is the purpose of the soap bath?
80. What should be the temperature of the final rinse?
81. Briefly describe the process of a water manicure.
82. How do you clean up after a manicure?
83. For what purposes is a hot oil manicure given?
84. For what conditions of the nails should a hot oil manicure be advised?
85. Describe briefly the process of an oil manicure.
86. What is an electric manicure? How does it differ from a hand manicure?
87. At what point in a hand and arm massage is the manicure given?
88. What supplies are used for a hand and arm massage?
89. What supplies are used in giving a pedicure?

90. How is the patron prepared for a pedicure?
91. How should the feet and legs be cleansed before the cream is applied?
92. Briefly describe the process of giving a plain pedicure.

Chapter XXI

FACIALS AND MAKE-UP

In order to give a proper facial, an operator should have a knowledge of: sterilization, sanitation, and hygiene; the diseases and abnormal conditions of the skin; the origin and insertion of the muscles of the head and neck, in order to massage these areas correctly; the location of the principal nerve centers, since vibratory movements are to be given at these points; the circulatory system of the head and neck, in order to stimulate the flow of blood to these parts and to assist in the elimination of waste products by the lymphatic system; the structure of the skin and its sweat and oil glands; the different textures of skin; overdry and overoily skin conditions; the physiologic effects of massage on the skin; the probable effects of hot and cold applications, electric currents, ultraviolet and infrared rays, and therapeutic lights on the skin; and the probable action of creams, softening and astringent lotions, bleaches, packs, clays, and make-up on the skin.

An operator should have the ability: to prepare a patron, remove her make-up, and give any kind of facial, bleach, pack, or mask; to give scientific massage manipulations; to use hot and cold applications, electric currents, ultraviolet¹ and infrared rays, and therapeutic lights; to prepare, apply, and remove any kind of pack, mask, or bleach; to relax and soothe the patron (one of the chief purposes of massage); to sterilize and care for instruments and equipment; and to compute the time for giving a facial and the cost of the materials used.

Electric appliances used in giving facials are: a wall plate to furnish galvanic, faradic, and sinusoidal currents; high-frequency apparatus, vibrator, electrolytic cup, therapeutic

¹ The laws of some states do not permit the use of ultraviolet rays in the beauty shop.

lamps which use red, white, and blue carbon filament bulbs, generators which produce infrared rays, and the carbon and mercury-vapor lamps which produce ultraviolet rays.

The frequency of facial treatments depends upon the condition to be treated. The age of the patron should be taken into consideration, and also the natural texture of the skin and the physical condition of the patron.

A healthy skin may be either of two general types:

1. With epidermal scales so fine and transparent as to show the blood underneath, down hairs colorless and invisible, and pores small and tightly closed.

2. With epidermal scales coarse, but showing the blood underneath, down hairs coarse, dark, and conspicuous because of their size and color, and pore openings large but tightly closed.

An unhealthy skin may be characterized by:

1. A sallow, dull appearance.

2. Open pores clogged with sebum which dries and hardens to form comedones.

3. Dryness and roughness from under-secretion or exposure, or both.

4. Oiliness from over-secretion.

5. Eruptions, milia, irritated areas, and symptoms of systemic disturbance.

The health of the skin depends principally upon the following factors:

1. The normal production of new tissue cells.

2. The continuous shedding of dead cells from its surface.

3. The composition of blood and the supply of blood to the germinative layer of the epidermis (stratum Malpighian).

4. The elimination of waste products.

5. The proper functioning of the glands of the skin.

An oily skin is one which, by its greasy and shiny appearance, indicates that an overabundance of oil is being secreted by its sebaceous glands. This may be a normal condition or an abnormal one. The oil is especially noticeable in the regions of the nose and parts of the cheeks where the glands are large and active. Even the almost invisible down hairs

have their oil glands, the secretions of which flood the openings of the hair follicles on the surface of the skin. Other sebaceous glands have no connection with hair follicles and open on the surface of the skin, for example, those about the nose and the external ear. Still other glands open on mucous membrane surfaces, such as those on the border of the lips.

The presence of an over-secretion of sebum may indicate a constitutional disorder. Normally, just enough oil should be excreted to keep the skin soft and to lubricate the hair shaft. Enlarged pores, with or without blackheads, pustules, and other abnormal conditions often accompany an overoily skin. The period of adolescence is a time of increased activity of all the glands of the body, and during this time abnormal skin conditions, with over-secretion of oil and the presence of pimples and blackheads, may be expected.

A **comedo**, or blackhead, is a plug of dried sebum in the opening of a sebaceous duct. The outer part is often dark or black, owing to an accumulation of oil and dirt; hence, it is called a "blackhead." To remove a blackhead, soften with cleansing cream or by steaming or warm applications, and use a comedo extractor.

The external care of an overoily skin includes cleansing it with a mild soap and soft water, or with cleansing cream, gentle massage to empty the pores of their contents, and the application of astringent lotions and packs.

A **dry skin** is one that is not supplied with enough oil from its sebaceous glands to lubricate it and to prevent the evaporation of moisture from its surface. The skin may be fine or coarse of texture, or harsh and rough from exposure and other causes. Fine wrinkles may appear early in life. Some of the causes of dry skin are as follows:

1. A pathological condition which interferes with the supply of nourishment by the blood.
2. Under-secretion of oil, or a secretion of abnormal character.
3. Exposure to the sun and wind.
4. Drying soaps and cosmetics. The glands may be supply-

ing oil which is removed by the daily cleansing or absorbed by the make-up.

Soft water and a mild soap, or a pure cleansing cream, should be used in cleansing a dry skin. The dryness may be relieved by the application of lubricating creams or massage oils, but the natural oils of the skin cannot be replaced by external applications. Facial treatments with massage and electricity may stimulate the glands to excrete more oil.

Wrinkles appear on parts of the body where the subcutaneous tissue is thin or practically absent. Some of the causes of the shifting of the fat cells of the subcutaneous tissues have been said to be: insufficient nourishment from the blood, muscular development from overexercise, lack of exercise (resulting in flabbiness), exposure to sun and wind, the use of strong chemicals, and, last and most probable of all reasons, the cell changes of advancing years.

Pigmentary disturbances of the skin are not very well understood by science. The local pigmented patches of lentigo, or freckle, cannot be completely removed by bleaches or packs. Some cases may respond more or less temporarily, but no bleach strong enough to injure the skin should be used. Sunburn may be relieved in the shop through the use of proper sunburn remedies, if the burn is not serious. Tan may respond to bleaching treatments which will scatter and lighten the pigment deposited in the skin in its effort to protect itself from the rays of the sun. The success of the treatments will depend upon the effect of the bleach on the pigment granules of the epidermis. Chloasma, or liver spot, and the white patches of vitiligo are not susceptible to local treatments.

Rules and Precautions

1. Wash and sterilize your hands before and after giving a facial, mask, bleach, or pack.
2. Use sterile instruments and standard supplies.
3. If the patron's skin shows abrasions, or an inflamed or pus condition, do not give the service.
4. Do not guarantee to eradicate wrinkles or change the natural texture of a patron's skin.

5. Keep bottles and jars labeled and closed.
6. Do not waste materials; use towels or tissues sparingly.
7. Do not use too hot towels; do not apply over-strong lotions.
8. Do not leave a pack on too long; do not pull or wrinkle the skin when removing a pack.
9. Be sure that you understand the working of electric appliances before you attempt to use them.
10. Observe all precautions when using electric currents on a patron's skin.
11. Be sure the machine is in working order before you make any connection. Turn the current on and off *slowly*.
12. Keep contact with the patron when turning the current on and off.
13. Keep all electric appliances clean and dry.
14. Do not handle appliances with wet hands; do not handle cords with greasy hands.
15. Wrap the electrode with wet cotton before handing it to the patron.
16. Watch the rheostat carefully. Avoid making the patron uncomfortable by giving her too much current.
17. Always turn the rheostat to zero before connecting the wall plate.
18. Test for polarity with care.
19. Glass electrodes and carbon electrodes break easily.
20. A therapeutic light is usually used over oil or cream on the skin.

Massage

Massage is a method treating the superficial soft parts of the body for remedial or hygienic purposes. It consists of rubbing, stroking, kneading, and tapping the skin with the hand or a device made for the purpose. Stimulating or soothing effects may be produced, depending upon the method used. Moderate, light, slow, and rhythmic movements should rest and relax a patron, while movements given with speed and pressure perform a special beneficial function. Too much speed and pressure, however, may be destructive to delicate skin tissues.

To give facial massage manipulations scientifically, the operator should be familiar with the anatomy and physiology of the body, especially the origin and insertion of the muscles, the location of the nerve centers, the blood vessels, and the general scheme of lymph drainage of the parts under manipulation. The hands should not be removed from the skin while the massage is being given; but if it is necessary to do so, the pressure should be gradually lessened until the fingertips leave the skin.

There are many different movements used in massage, their scientific application depending upon the effect to be produced. Most of these movements are variations of the five principal movements, which are briefly described as follows:

1. **Effleurage.** A gentle, light, stroking movement, or a long, sweeping one, made with the cushions of the fingers or the palms. The hand returns to the first position without leaving the surface of the skin. This is the most relaxing and soothing of all massage movements.

2. **Tapotement, or percussion.** The variations of this movement include tapping, slapping, chopping, or cupping, using both hands alternately in quick succession. The movements are made with the fingertips or the side of the hand.

3. **Petrissage.** This is a kneading movement, which may be light or heavy. Deep kneading consists in grasping the tissues and compressing them, raising the muscles and using pressure to reach the under tissues.

4. **Vibration.** Vibratory or trembling movements are given with the fingertips of one or both hands placed against the surface of the skin. The fingers may be held close together or spread apart, without sliding over the skin.

5. **Friction.** Deep rubbing movements of the palm or fingertips, with pressure, by which the skin is moved over the subcutaneous tissues.

Beneficial results from massaging the tissues of the skin include the following:

1. Stimulation of the circulation of the blood and thereby supplying fresh oxygen and food to the tissue cells.

2. Stimulation of the circulation of lymph in the vessels of the lymphatic system which carry waste products.
3. Stimulation of the glands of the skin to excrete normally their secretions of sebum and perspiration.
4. Restoration of muscle tone.
5. Relaxation of nervous tension.
6. Breaking down of fat cells for elimination by the vessels of the lymphatic system.

PLAIN FACIAL

Supplies.²

Towels	Cotton pledgets
Chair cloth	Spatulas and toothpicks
Light blanket	Creams and lotions
Cosmetics for make-up	Astringent, tonic, and oil Glass or porcelain dish

Preparing the patron.

1. Remove patron's dress and shoes.
2. Seat the patron and adjust the chair.
3. Cover the patron with a chair cloth and light blanket; place headband.
4. Wash and sterilize your hands in the presence of the patron.
5. Examine the patron's skin.

Giving the facial.

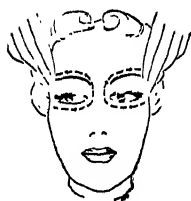
1. Apply cleansing cream; spread well over face, neck, and shoulders with upward manipulations.
2. Remove cleansing cream, and apply night cream or massage oil in the same manner, with upward manipulations.
3. Give facial massage routine.
4. Remove the cream or oil.
5. Sponge with tonic or astringent lotion; pat until dry.
6. Apply foundation cream or lotion and make-up.

²Supplies that come in direct contact with the patron in this and every other manipulative procedure must be sterile.



A. Place the two middle fingers of the left hand on the left temple, the two middle fingers of the right hand beside and above those of the left hand. Sliding one hand and then the other, work up and down from the corner of the left eyebrow across the forehead to the right temple. Pause, and work from the corner of the eyebrow on the right temple, across to the first position on the left temple. Repeat three times.

B. Place the two middle fingers of each hand on the temples, the thumbs at the forehead hairline. Rotate with the fingers across the forehead making six or eight circles toward the center until the fingers meet between the eyebrows. Pause, and slide the fingers across the forehead back to the temples. Repeat three times.



C. Place the thumbs in the center of the forehead, and with the second finger of each hand at the inner corners of the eyes, stroke lightly across the upper eyelid to the outer corners of the eyes. Pause. With the second fingers at the inner corners of the eyes, at the nose, stroke across the lower eyelids to the outer corners of the eyes. Pause. Repeat three times.

D. With the second finger and the thumb of the left hand, stretch the skin near the eye. With the two middle fingers of the right hand near the second finger of the left hand, below the corner of the eye, make three upward and two downward strokes toward the ear. Pause on the auricular nerve in front of the ear. Repeat three times.



FIG. 25. FACIAL MASSAGE.



E. Place the two middle fingers of each hand at the corners of the mouth. Rotate upward to the temples. Pause, and slide the fingers back to the first position. Repeat three times.

F. Place the little finger of each hand below and in front of the ear, the third finger of each hand at the center of the jaw, the second finger at the point of the chin, the first finger free, and the thumbs above the eyebrows. Hold the fingers in position, slide the thumbs down the sides of the nose, rotate. Slide to the tip of the nose and up the bridge to the first position. Repeat three times.



G. Standing at the right of the patron, place the first finger of the right hand in the center of the upper lip, the thumb and second finger at the corners of the mouth. Lift the hand with a firm pressure upward. Take the same position with the left hand over the lower lip. Repeat three times.

H. Place the four fingers in front of the ear, slide downward to the center of the chin, slide up and back to a point just below the lobe of the ear. Slide down the neck to the sternum, then rotate up the sides of the neck. Pause behind the ear. Slide back to first position. Repeat three times.

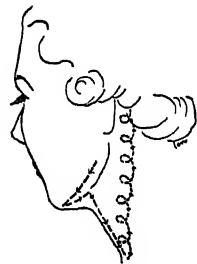


FIG. 25. (Continued).

I. Place the hands on the shoulders at the neck, thumbs in front, palms and fingers at the back. Rotate or slide across the shoulder, down the back, then bring the fingers together at the spine. Slide up the spine with pressure. Repeat three times.

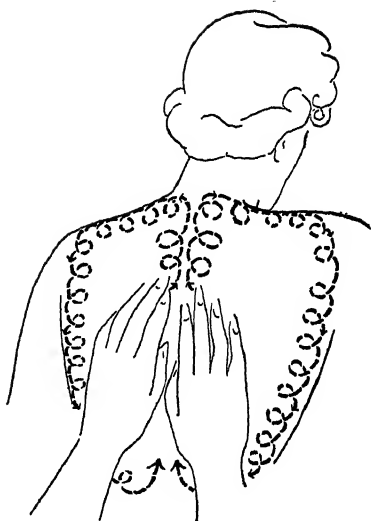


FIG. 25. (Concluded).

Completing the facial.

1. Remove the headband, arrange the patron's hair, and adjust the chair to upright position.
2. Remove the blanket and chair cloth.
3. Assist the patron with her shoes and dress.

Clean up.

1. Fold and put away blanket and chair cloth.
2. Put away supplies.
3. Place waste in covered container.
4. Sterilize equipment and place in cabinet sterilizer.
5. Wash and sterilize your hands.

Facial with Electricity

Using faradic current. Prepare the patron as for a plain facial. Cleanse the face and apply night cream or massage oil. Connect the wall plate to the wall socket. Prepare the

electrodes. Wrap the carbon cylinder electrode with wet cotton, connect it to the conducting cord, and place it in the patron's hand. Place wet cotton under the metal on the wrist electrode, tighten the band, connect to the cord, and place your hand with the wrist electrode on the patron's forehead. Place selector switches on F and S. Turn the rheostat slowly to the proper degree, between 10 and 20. Give manipulations. To disconnect, keep contact with the patron and turn the rheostat and selector switches to zero. Remove the conducting cords from the patron's and wrist electrodes. Disconnect the wall plate.

Using galvanic current. Test for polarity. *Precaution:* never give manipulations while using galvanic current.

To contract the pores to harden and contract flabby muscles, use the positive galvanic current. Prepare the patron as for a plain facial, cleanse the face, apply night cream or massage oil, give manipulations if desired, and remove the cream thoroughly with cleansing tissue and soda solution (one teaspoonful of baking soda to one small glass of water). Connect the wall plate to the wall socket. Prepare the electrodes. Wrap the carbon cylinder electrode with wet cotton, connect it to the negative pole, or cathode, and place it in the patron's hand. Place wet cotton around the massage roller electrode, connect to the positive pole, or anode, and place it on the patron's forehead. Prepare the wall plate. Place selector switches on G and G. Turn the rheostat slowly to the proper degree, between 10 and 20. Roll the massage roller electrode slowly over the face for not more than five minutes. This process is known as *cataphoresis*.

To open the pores and to soften and relax the tissues, use the negative galvanic current. Cleanse the skin thoroughly with cream, and remove the cream completely with a soda solution. Place the electrode connected to the positive pole, or anode, in the patron's hand, and roll the electrode connected to the negative pole, or cathode, slowly over the patron's face for a few minutes. This process is known as *anaphoresis*.

To disconnect, keep contact with the patron and turn the

rheostat and selector switches to zero. Remove cords from the electrodes. Disconnect the wall plate.

Using high-frequency current. If direct application is required, use the facial electrode directly on the face of the patron, over the night cream or massage oil. If indirect application is required, give the patron the facial or metal electrode to hold and proceed with the manipulations over the cream or oil.

A Bleach Facial

A bleach facial is given for the purpose of whitening the outer layer of the skin when it has lost its natural tint from exposure, illness, or neglect, and also to dissolve and scatter the pigment formed as a protection against the ultraviolet rays of the sun. A naturally dark skin, one containing much natural pigment, cannot, of course, be bleached to a whiter shade without resorting to extreme measures which are not advisable in any case. Any type of bleach facial or pack may be given to sallow or tanned skin. A skin with an abundant supply of oil may resist the action of the bleach. Bleaching applications will have little effect on skin discolorations caused by systemic conditions.

Bleaching preparations are in solution and paste forms. They should not remain long on the skin because of their drying effect. For this reason regular bleaching treatments should not be advised. The bleach should not come in contact with the hair and eyebrows.

FACIAL BLEACH

Supplies.

Towels	Creams, lotion, astringent, witch
Cotton pledgets	hazel, and oil
Spatulas	Bleach
Chair cloth	Cosmetics for make-up
Light blanket	Glass or porcelain dish

Preparing the patron.

As for a plain facial.

Giving the bleach.

1. Apply cleansing cream, removing it from the jar with a spatula. Warm it on the fingers and apply it to the face, neck, and shoulders.
2. Remove the cleansing cream with tissue and apply night cream or massage oil.
3. Give a facial massage.
4. Cover the eyes with witch hazel pads.
5. Apply the bleach evenly to the face, neck, and shoulders.
6. Use a therapeutic light, if desired, moving it constantly.
7. Leave the bleach on the face for no longer than 10 minutes.
8. Remove the bleach with warm wet steam towels.
9. Apply a mild astringent.
10. Apply make-up.

Clean up.

As for a plain facial.

OIL MASK**Supplies.**

As for a plain facial.

Add: Gauze or thin cotton for mask

Small dish with warm oil

Soda solution (1 teaspoonful soda to small glass of water)

Witch hazel

Preparing the patron.

As for a plain facial.

Giving the mask.

1. As for a plain facial to the application of night cream or massage oil.
2. Remove the cream or oil and apply the mask:
 - a. Cover the eyes with witch hazel pledgets.
 - b. Apply the mask to the face; leave the nostrils uncovered.

- c. Saturate a cotton pledget with warm oil and apply to the mask, patting gently.
 - d. Therapeutic lamp, if desired.
 - e. Leave mask on face not more than ten minutes.
 - f. Remove mask and sponge with soda solution.
3. Apply astringent and finish as for a plain facial.

Clean up.

As for a plain facial.

Facial Packs

Packs are applied to the face principally for the following purposes:

1. To stimulate the circulation of the blood.
2. To assist the skin in performing its function of excretion.

All packs are applied in much the same manner. The skin is cleansed with cream, the cleansing cream is removed, pads are placed over the patron's eyes, the pack is applied to the face, directly or over sterile gauze, the pack is removed, and the treatment is finished by an application of foundation cream and make-up.

GIVING A PACK

Supplies.

As for a plain facial.

Add: Gauze (a slight opening should be made for the nose)

Spatula

Steam towels

Almond meal, clay, witch hazel, egg white, or a commercial pack

Preparing the patron.

As for a plain facial.

Giving the pack.

1. Proceed as for a plain facial to the removal of the night cream or massage oil.

2. Cover the patron's eyes with cotton pledgets saturated with witch hazel.
3. Apply one of the following packs:
 - a. *Clay pack.* Remove the clay from the jar with a spatula and spread it evenly over the face, neck, and shoulders. Use a therapeutic light, if desired, moving it constantly and keeping it at least 18 inches from the patron's face. Leave the pack on for not more than 10 minutes. Remove the pack with warm wet steam towels.
 - b. *Almond meal pack.* Mix to a heavy cream equal parts of witch hazel and water with almond meal. Apply and remove as for a clay pack.
 - c. *Witch hazel pack.* Place sterile gauze over the patron's face. Apply the pack. Leave the pack on the face for not more than 10 minutes. Remove it with warm wet steam towels.
 - d. *Egg white pack.* Place sterile gauze over the patron's face. Apply the egg white (beaten slightly) with a cotton pledget. Use a therapeutic light, if desired, moving it constantly and keeping it at least 18 inches from the patron's face. Leave on until the pack is thoroughly dry. Remove the pack with wet cold steam towels.
 - e. *Commercial pack.* Use according to the manufacturer's instructions.
4. Apply an astringent as for a plain facial and proceed as in "Giving the facial."

Complete and clean up as for a plain facial.

Make-Up

Make-up is applied to the face for the purpose of improving the appearance by emphasizing the beauty of features and skin and making defects less conspicuous. Cosmetics should be chosen that will harmonize with and enhance the natural coloring of the skin.

To give a proper street or evening make-up, an operator

should have a knowledge of: the structure of the skin; composition of cosmetics and their effects upon the skin of different textures; color harmony; suitable make-up for any occasion; and the effect of make-up under artificial light.

An operator should have the ability: to observe safety and sanitary precautions; to prepare a patron and to select and apply foundation cream or lotion, rouge, powder, mascara, eye-shadow, eyebrow pencil, and lip rouge for day or evening and for any occasion; and to avoid extreme and artificial effects.

General Rules for Applying Make-Up

Foundation cream or lotion.

Apply sparingly in most cases.

Apply more freely to nose and chin, where pores are over-large.

Rouge.

Apply cream and paste rouges before the powder, with a small spatula or toothpick, and blend.

Apply dry rouge after the powder with a cotton pledget.

For a round face, apply in a triangle.

For a long face, apply across the cheeks.

For a square face, apply down the cheeks.

When applying rouge, take the cheek bones into consideration.

To make a broad face appear narrower, apply close in on the cheeks.

To broaden a narrow face, apply on the edges of the cheeks.

Apply underneath high cheek bones.

To shorten a long face, apply a touch on the chin.

Do not apply so heavily as to dominate the other features.

Do not use rouge for tan make-up; the accent in such a make-up should be on the eyes and lips.

Powder.

Keep powder in a shaker, closed and labeled.

Sprinkle the powder on a cotton pledget and apply with an upward rotary movement; use the pledget only once.

Select a shade of powder which will blend with the natural color of the skin.

Powder heavy features very lightly.

Remove surplus powder with a powder brush.

Eyebrow pencil.

Use to shape and darken thin and light eyebrows.

Do not apply the pencil too heavily on the skin.

Eyeshadow.

Remove the eyeshadow from the container with a sterile toothpick or small spatula.

Apply sparingly and blend.

Apply to the upper eyelid only; blend lightly from lashes to brows.

To deepen the color of the eyes, shade off gradually from the center toward the outside.

Use light eyeshadow for deep-set eyes.

Cream may be used on the eyelids to give a moist effect.

Select the color which will enhance the beauty of the eyes.

Mascara.

Protect the patron's eyes; mascara is irritating to delicate membranes.

Hold a piece of sterile gauze under the eyelid.

The patron should turn her eyes upward.

Apply to the ends of the lashes only, if a less noticeable effect is desired.

Do not use the mascara too wet; it should dry quickly.

The brush should be cleansed after being used.

Lip rouge.

Apply lip rouge after the other make-up.

The mouth should be relaxed, the lips slightly parted.

Apply to the upper lip first.

Place sterile tissue between the patron's lips and ask her to close them in order to remove excess rouge with the tissue.

If both lips are full, apply color heaviest at the center and blend toward the edges of the mouth.

Do not go too high on the upper lip.

Fullness taken from the center of the lips will shorten a long chin.

Apply more color to the center of a large mouth to make it appear smaller.

Apply sparingly to a heavy lower lip.

Extend the line of a thin lower lip at the center.

Lip rouge and cheek rouge should harmonize in color.

STREET MAKE-UP

Supplies.

Towels	Eyebrow brush
Cotton pledgets	Powder brush
Foundation cream or lotion	Spatulas and toothpicks
Astringent lotion	Make-up cosmetics

Preparing the patron.

As for a plain facial.

Giving the make-up.

1. Cleanse the face with cream.
2. Remove the cream; apply astringent and pat until dry.
3. Apply foundation cream or lotion, then apply cream rouge to the cheeks and blend.
4. Dust powder into the hollow of the neck and apply to the skin with a cotton pledget with upward movements.
5. Remove surplus powder with powder brush or cotton pledget.
6. Cleanse eyebrows and lids and apply eyeshadow.
7. Apply mascara with a brush; use an eyebrow pencil for the eyebrows.
8. Apply lip rouge with a sterile toothpick and blend.

Clean up.

1. Clean table and chair.
2. Put away supplies.
3. Place soiled towels and waste in covered containers.
4. Wash and sterilize your hands.

Evening Make-Up

The application of make-up for artificial light follows the same rules as for a street make-up except that darker colors are used and heavier applications are made. Artificial light will soften the effect of the bright colors used.

Questions

1. What knowledge should an operator have in order to give a scientific facial?

2. Why is it necessary to know the location of the muscles of the head and neck and of the principal nerve centers in order to give a facial?

3. What abilities should an operator possess in order to give facial treatments correctly?

4. Name the electric appliances used in giving facials.

5. Upon what does the frequency of facial treatments depend?

6. Describe the two general types of healthy skin.

7. What is the appearance of an unhealthy skin?

8. Name some of the factors upon which the health of the skin depends.

9. What is meant by an oily skin?

10. Does overoiliness always indicate an abnormal skin condition?

11. Are all sebaceous glands connected with hair follicles?

12. How much oil should be excreted, normally, by the skin?

13. What abnormal conditions often accompany an oily skin?

14. What skin conditions can be expected to develop during adolescence?

15. Why is a comedo called "blackhead"? How may it be removed?

16. What treatment should be advised for an oily skin?

17. For what purpose are astringent lotions and packs applied to an oily skin?

18. What is meant by a dry skin?

19. Give some of the causes of dryness of the skin.
20. What precautions should be taken in cleansing dry skin?
21. What treatment would you advise for a dry skin?
22. Can the natural oils of the skin be replaced by external applications?
23. Name some of the general causes of wrinkles.
24. How may lack of nourishment to skin cells cause wrinkles?
25. How much is known of the origin of pigmentary disturbances of the skin?
26. Name some pigmentary disturbances of the skin.
27. How may freckles be treated in the shop? Can they be permanently removed?
28. How should sunburn be treated?
29. What effect will bleaching have on tanned skin?
30. How do chloasma and vitiligo respond to local treatments?
31. What is the first thing to do before giving a facial?
32. Under what conditions should a facial not be given?
33. Can wrinkles always be eradicated by facial treatments?
34. Can the texture of the skin be changed by a facial treatment?
35. Why should too hot towels and over-strong lotions not be used during a facial?
36. Give some rules for handling electric appliances when giving a facial.
37. Should contact be kept with the patron when turning the current on and off?
38. Why should electric appliances be kept dry and not handled with wet hands?
39. How would you wrap an electrode before giving it to a patron to hold?
40. Why should glass and carbon electrodes be handled carefully?
41. Why should the rheostat be carefully watched?
42. Define massage.
43. Of what does massage consist?
44. What is the effect produced by light, rhythmic movements?

45. Why should too much speed and pressure not be used?
46. What special knowledge of anatomy should an operator have in order to give massage scientifically?
47. Name the principal movements used in massage.
48. Describe the movements used in effleurage.
49. Which massage movement is the most relaxing to body tissues?
50. What kind of movements are used in tapotement or percussion?
51. What is the kneading movement in massage called? How is it performed?
52. How are vibratory movements given?
53. How is the massage movement known as friction performed?
54. Name some beneficial results from massage.
55. What effect should massage have on the circulation of the blood?
56. How is the lymphatic system affected by massage?
57. How are the muscles affected by massage? The nervous system?
58. What supplies are used in giving a plain facial?
59. Why should the patron's skin be examined before giving a facial?
60. How is the patron protected when a facial is being given?
61. How is a plain facial completed?
62. Briefly describe the process of a plain facial.
63. What electric currents are used in giving facial treatments?
64. Briefly describe the process of using the faradic current.
65. How are the electrodes prepared when using the faradic current?
66. What precautions should be observed when disconnecting the faradic current?
67. Should a test for polarity always be made when giving a facial with galvanic current?
68. What special precaution regarding manipulations should be observed when using the galvanic current?

69. Briefly describe the method of using the galvanic current for contracting the pores and hardening flabby muscles.

70. Is the positive or negative galvanic current used to contract the pores?

71. How is soda solution prepared? For what purpose is it used?

72. What is cataphoresis?

73. Which galvanic current is used to open the pores and relax the tissues?

74. What is anaphoresis? Describe the process of anaphoresis.

75. To what point should the rheostat be turned when disconnecting the galvanic current?

76. How is the high-frequency current used by direct application?

77. How is high frequency used indirectly?

78. What is the purpose of a bleach facial?

79. In what ways may the skin lose its natural color?

80. Can a naturally dark skin be bleached to a lighter shade?

81. What treatment should be given to a sallow or tanned skin?

82. Can an oily skin be bleached as easily as a dry skin?

83. In what forms are bleaching preparations made?

84. Why should bleaching preparations not remain long on the skin?

85. Are regular bleaching treatments advisable?

86. Briefly describe the process of a facial bleach.

87. Describe the process of an oil mask.

88. For what purposes are facial packs given?

89. How are the eyes protected when a pack is being given?

90. Name four kinds of packs used for improving the appearance of the skin.

91. In what different ways may a pack be applied to the skin?

92. How is a clay pack prepared? How is it used?

93. How is an almond meal pack prepared?

94. How is a witch hazel pack applied?

95. Describe the application and removal of an egg white pack.
96. What is meant by a "commercial" pack?
97. For what purpose is make-up applied?
98. How may make-up improve the appearance?
99. How should cosmetics be chosen to produce a natural effect?
100. What knowledge should an operator have in order to apply make-up properly?
101. What abilities should an operator possess in order to give a proper make-up?
102. What effects should be avoided in order to produce a natural and becoming make-up?
103. Should foundation cream be heavily applied?
104. In what sanitary manner should paste rouge be removed from the container?
105. Is paste rouge applied before the powder or after?
106. When should dry rouge be applied, and in what manner?
107. How should rouge be applied to a broad face? A square face?
108. How should the rouge be placed if the face is narrow?
109. How may a broad face be made to appear narrower?
110. How would you broaden a narrow face?
111. Should rouge be placed high on prominent cheek bones?
112. For what purpose is rouge applied to the chin?
113. Should powder be applied from an open container?
114. How should the shade of powder be selected?
115. How should heavy features be powdered?
116. How should surplus powder be removed?
117. For what purpose is an eyebrow pencil used?
118. Is eyeshadow applied to the lower lids?
119. How is eyeshadow applied to deepen the color of the eyes?
120. What precaution should be observed when using mascara?
121. How should mascara be applied?
122. At what point in the make-up should lip rouge be applied?

123. Where should lip rouge be applied first?
124. How should lip rouge be applied to full, heavy lips?
125. How may a long chin be shortened by a proper application of lip rouge?
126. Briefly describe the process of giving a street make-up.
127. How does evening make-up differ from street make-up?

Chapter XXII

REMOVING SUPERFLUOUS HAIR

Hypertrichosis is the term applied to hair growth on any part of the body in excess of the amount usually present in persons of the same race, sex, and age. The causes of hypertrichosis are discussed in Chapter IX, "The Hair and Nails."

The methods of removing superfluous hair are of two types:

1. **Temporary methods:** clipping, shaving, tweezing, and depilatories.

2. **Permanent method:** electrolysis.

Temporary Removal of Hair

Hair may be removed temporarily by **tweezing** or by the use of **depilatories**. The hair will, however, grow again, as the hair papillae are not affected by this process, and the hair-making cells will continue to produce hair.

To remove hair by a temporary method, an operator should have a **knowledge of:** methods of sterilizing the skin of the patron and all instruments and articles used in the process; the structure of the skin and hair; the direction of hair growth; and the composition and effects of chemicals, waxes, astringents, and creams on the skin and hair.

An operator should have the **ability:** to observe safety and sanitary precautions; to sterilize the skin and to remove hair by means of cutting, shaving, tweezing, and depilatories from the legs, arms, armpits, face, and neck without injury to the patron; to arch the eyebrows to conform to the contour of the face, with or without altering the facial expression; and to care for all tools and equipment.

Eyebrow Arching

The expression of the face may be changed by changing the arch of the eyebrows. Greater width may be shown between

the eyes, the eyes themselves may be made to appear larger, or a lift may be given to heavy features, by skillfully shaping the brows. Only by removing the scattered hairs that are often found above and below the natural browline can a well-groomed appearance be achieved. Both brows must, of course, show the same curve and be of equal thickness; hairs must be removed with the final effect in view. The thinning should not result in an artificially narrow line, but should give the appearance of a natural line of growth. The natural browline follows the curve of the upper rim of the eyesocket, and this line should be followed unless the patron expresses a preference for some other effect.

Tweezing the Eyebrows

The brows should be well brushed and the natural browline determined before cream is applied to soften the area. The skin should be held taut, and the tweezers should take hold of the hair as close to the surface of the skin as possible. The hair should be given a quick, firm pull, always in the direction in which the follicle lies in the skin. Hot packs are sometimes applied before tweezing to soften the skin. An antiseptic and an astringent, such as alcohol, should be applied after the brows have been arched. The browline may be shaped with an eyebrow pencil before removing the excess growth. An eyebrow pencil may also be used to give length to a short browline.

ARCHING TWEEZE

Supplies.¹

Tweezers	Astringent
Cotton pledgets	Boric acid solution or witch hazel
Spatulas	Cream
Towels	Antiseptic
Eyebrow brush	Jar for sterilizing solution

¹ Supplies that come in contact with the patron in this and every other manipulative procedure must be sterile.

Preparing the patron.

Towel over chest. Remove eyebrow make-up.

Boric acid or witch hazel pads over eyes.

Apply cream.

Giving the tweeze.

Remove the cream with cotton pledget and astringent.

Hold the skin taut and pull the hair in the direction of its growth.

Apply antiseptic.

Apply astringent with cotton pledget.

Apply eyebrow make-up if desired.

Clean up.

Sterilize equipment and place in cabinet sterilizer.

Put away supplies.

Clean work table.

Removal of Hair with Depilatories

A **depilatory** is an agent used to remove hair. Depilatories come in liquid, paste, powder, and wax forms, and are used to remove excess hair on the eyebrows, legs, arms, and armpits. All of the hair of the area treated, both fine and coarse, will necessarily be removed in the process. **Paste** depilatories, and those in powder form which are made into a paste before being used, are spread over the area to be treated, left on for the required time, and removed, usually with cotton and warm water. The hair is softened and dissolved by the action of the strong chemicals in the product. **Waxes** used for the removal of hair, while classified, commercially, as depilatories, are, properly speaking, epilatories, as they bring the hair out by the bulb or root. The wax is heated, applied to the skin while warm, and allowed to harden. When the wax is removed, it will bring the hair with it. Great care should be used when applying wax to a sensitive skin.

PASTE DEPILATORY ARCHING

Supplies.

As for an arching tweeze.

Add: Depilatory powder or paste

Preparing the patron.

As for an arching tweeze.

Giving the arch.

Remove cream.

Apply depilatory paste with a spatula.

Remove with cotton and warm water, or according to the directions of the manufacturer.

Apply antiseptic.

Apply astringent.

Clean up.

As for an arching tweeze.

WAX ARCHING

Supplies.

As for an arching tweeze.

Wax depilatory. Test for temperature on the wrist. Do not apply too hot.

Preparing the patron.

As for an arching tweeze.

Giving the wax arch.

Remove cream.

Apply wax around browline; press down. Allow the wax to harden.

Remove wax by pulling in the opposite direction to hair growth.

Apply antiseptic.

Apply astringent.

Apply eyebrow make-up, if desired.

Clean up.

As for an arching tweeze.

Rules and Precautions

1. Use sterile instruments and standard supplies. Living structures are being worked upon, and they are subject to injury and infection.

2. Place the tweezers in a jar of sterilizing solution when not in use during the process. After the tweeze, sterilize the tweezers and place them in a cabinet sterilizer.

3. Do not remove hair from a skin surface that appears irritated or inflamed.

4. Do not give an eyebrow arch immediately preceding an eyebrow dye.

5. Do not burn the skin with hot wax.

6. Do not use too much wax or allow it to cover any hairs that are not to be removed.

7. Keep liquid depilatories well corked; keep wax covered and in a cool place.

8. When using depilatories, follow the instructions of the manufacturer.

Electrolysis

Electrolysis is the act or process of chemical decomposition by the action of an electric current. In cosmetology the term means the destruction of superfluous hairs and small growths on the skin, such as warts and moles, with an electric needle. A person who is trained to remove hair and superficial skin growths from body tissues by the use of electric currents is called an **electrologist**.

Electrolysis is the only safe method for the permanent removal of hair. The galvanic current is used because of its chemical action on skin tissues. The current is applied through the point of a needle, and the hair follicle and papilla are decomposed by the chemical action which takes place at the point of the needle when the electric current comes in contact with the skin tissues.

Since the action is a chemical one, which is proved by the

bubbles of hydrogen gas which usually appear when the skin structures are being destroyed, pressure on the needle is unnecessary. Electrolysis is not a heat process, and the needle remains cold; therefore, the operation should not be painful, and it is not necessary to apply a local anesthetic, which would not be permitted in a beauty shop. The electric needle should never be used if the skin is inflamed or if it shows eruptions or abrasions.

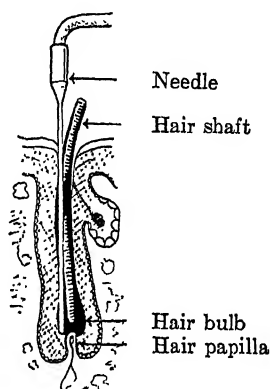


FIG. 26. ELECTROLYSIS, SHOWING NEEDLE IN HAIR FOLLICLE.

The structures to be destroyed in the permanent removal of hair are the follicle and papilla. The hair follicle is a sheath-like depression or pouch formed by a dipping down of the epidermis into the corium. The neck of the follicle at the surface of the skin is usually its narrowest part. Below the skin surface it becomes slightly larger, until at the bottom of the follicle the hair papilla, a small cone projecting from the surface of the corium, is reached. The papilla is supplied with blood vessels and nerve filaments, and it is this vital cell-making structure that must be completely destroyed by the electric current before a hair can be said to be permanently removed. The object of the operation is to destroy the follicle and papilla without injury to the surrounding tissues or discomfort to the patron. If the electric current does not reach the papilla, the hair will return. About five per cent of the

hairs removed by electrolysis grow again; the cells of the papilla have not all been destroyed, or the papilla has not been reached by the electric needle.

To remove hair or small growths on the skin by electrolysis, an operator should be familiar with the contents of the following chapters of this book:

- Chapter IV. The Skeletal System.
- V. The Muscular System
- VI. The Nervous System
- VII. The Circulatory System
- VIII. The Skin
- IX. The Hair and Nails
- X. Diseases and Abnormal Conditions of the Skin, Hair, and Nails
- XI. Sterilization and Sanitation
- XIII. Electricity in Cosmetology

An electrologist should have good eyesight and a steady hand, and a knowledge of: the laws governing the practice of electrolysis in her state; the different methods of electrolysis; the effects of electric currents on skin tissues; and the strength of current and the time required to decompose the follicle and papilla of hair of any texture.

An electrologist should have the ability: to observe safety and sanitary precautions; to use electric appliances skillfully; to test for polarity; to judge the texture of the skin and hair; to recognize the degree of skin sensitivity in order to use the best method for the removal of hair; to prepare the skin of a patron and, using either single- or multiple-needle method, to destroy a hair follicle and papilla without injury to the surrounding tissues or discomfort to the patron; and to give proper treatment after the hair has been removed.

The multiple-needle method is the most commonly used. The single-needle equipment consists of one needle, which is inserted into a follicle, removed, and inserted into another follicle, until an entire area has been treated. The arm of a multiple-needle apparatus is so constructed that its needle holders may contain twelve needles, several, or all, of which can be used at one time. When the last needle has been

inserted, the first needle is removed, and the process is continued until all the needles have been inserted, removed, and reinserted over a certain area of skin. Use of the multiple needle requires more experience and proficiency than that of the single needle because of the accuracy necessary in the timing and in judging the amount and strength of current required by the variations in the resistance and texture of the individual hairs.

Equipment for electrolysis consists of a wall plate or battery with a milliamperere meter, single-needle or multiple-needle holders, needles, conducting cords, electrodes (which should be covered with moist cotton or gauze), pliers for removing needles from the sterilizing solution, epilation forceps for removing hairs, and a binocular magnifier or other type of magnifying glass.

Needles are of steel, gold, or platinum, of different sizes, and with a slightly bulbous or blunt point for safe insertion into the hair follicle. A needle with a sharp point may easily pierce the side wall of the follicle instead of contacting the papilla, and result in injury to delicate skin tissues. The variations in slant of the follicles (some are bent or curved) make it necessary to proceed with the needle with great caution. A blunt needle offers safe entrance into the follicle. If the wall of a follicle is punctured by the needle, a scar may result. If a slight hemorrhage occurs, an antiseptic may be applied. A small eschar may appear after the destruction of a hair, but it should disappear after a few days.

A test for polarity must be made. The needle must always be connected with the negative pole. The positive conducting cord is always connected to the carbon electrode, which is held by the patron. The circuit is completed through the patron. A wrist electrode should never be used.

Sterilization of needles, epilation forceps, and pliers may be accomplished by dipping them into a sterilizing solution and placing them in a cabinet sterilizer when not in use. The needles should be removed from the solution with sterile pliers and inserted into the needle holders, and also withdrawn from them, without contact with the hands. Sterile towels, head

rests, chair cloths, and so forth, must be used. The skin of the patron should be sponged with alcohol, which should be allowed to evaporate before the epilation begins. The alcohol will remove perspiration or other moisture from the skin. Water is a conductor of electricity, and the skin must be perfectly dry before the electric needle is used.

Insertion of the needle. The skin should be examined through a magnifying glass and the slant of the follicle determined. The needle is passed into the follicle beside and below the hair, and pressed gently downward at the proper angle until the papilla is reached. An electrologist should be able to recognize an abnormal slant of a hair follicle, and should not attempt to insert a needle into a follicle if the entrance seems to be blocked by an abnormal growth of tissue. Bubbles of hydrogen gas around the needle will indicate that coagulation of the papilla is taking place. When using the multiple-needle method, the bubbles do not always appear.

Epilation. The hair sometimes comes out when the needle is withdrawn. If decomposition of the papilla has taken place, the hair can readily be withdrawn by the epilation forceps. If the papilla fails to release the hair, the needle should be reinserted and the current increased.

The strength of the current depends upon the degree of resistance of the patron and the texture of the hair. Hairs of like texture, such as coarse, conspicuous ones, should be removed before the finer hairs, and the same strength of current used for each. Less current will be necessary for the removal of fine hairs.

The time required for the electric current to destroy a hair follicle and papilla depends upon the strength of the current, the sensitiveness of the skin, the resistance of the hair structures, the texture of the hair (stiff, bristly hair will require more time than soft, fine hair), and the area to be treated. The hairs of the upper lip and the cheeks will require more time than those of the chin, neck, arms, and legs.

Rules and Precautions

1. Always connect the needle with the *negative* pole.
2. Always test for polarity.

3. Use sterile instruments; sterilize your hands.
4. Never use a wrist electrode.
5. Do not remove a hair near an eruption or abrasion of the skin.
6. Be sure that the needle is in the follicle. If the wall is punctured, the patron will feel a slight burning sensation.
7. Do not force the needle into the follicle; slide it gently downward.
8. Give the current sufficient time for chemical action to take place.
9. Do not remove too many hairs in the same area, or at one time, and do not give treatments too often. More time should elapse between epilations if the skin is sensitive and easily irritated.
10. Do not insert the needle until the skin is perfectly dry.
11. Focus a good light on the area under treatment.
12. Do not remove hair from a birthmark without first consulting a physician.
13. Do not neglect to give correct after-treatment to the epilated area.
14. Do not breathe in the patron's face while working over her.
15. Advise the patron not to touch the area treated with the hands, or use water, soap, or cosmetics on it for twenty-four hours after the removal of hair.
16. Keep conducting cords free from grease; disconnect the wall plate when not in use.
17. Never connect the needle with the *positive* pole.

Removal of Growths by Electrolysis ²

Electrolysis may be used for the removal of small growths, such as warts, moles, milia, and other skin blemishes. Only the common warts and ordinary small pigmented moles of the face and neck should be removed in a beauty shop. The galvanic current is used, and the chemical process of cauterization takes place, decomposing the abnormal tissue.

² Many states do not permit the removal of growths by electrolysis in a beauty shop.

The needle should have a sharp point, and should usually be longer and larger than one used for the removal of hair. The strength of current to be used depends upon the type of growth and the resistance of the patron. From two to four milliamperes is usually the strength used on the average growth, depending upon the make of the machine and the instructions of the manufacturer.

If a mole has hairs, the hairs should be removed before the elevation is treated. Sometimes the removal of the hairs will cauterize the growth and make further treatment unnecessary.

The needle should be inserted through the growth, flat against the skin, from one side of the growth to the other. It should remain inserted until hydrogen gas bubbles collect about it as it is moved back and forth. The needle should then be removed and again inserted at right angles to the first insertion, the two insertions forming an X. Two insertions of a needle are often sufficient to decompose a small growth. For larger growths, the needle should be reinserted at different angles to the first insertion until a cart wheel has been formed. Sometimes six or eight insertions are necessary to destroy a growth. It is necessary that the whole surface of the growth be destroyed by the electric current; otherwise, part of the growth will return.

When being cauterized, a growth usually assumes a whitish appearance which shortly turns brown and forms an eschar. This eschar disappears in a few days. Home treatment consists in keeping the eschar perfectly dry until new tissue forms underneath it, when it will loosen and be naturally removed. It should not be touched by the fingers.

REMOVAL OF HAIR BY ELECTROLYSIS

Supplies.³

Chair cloth
Towels
Cotton

Magnifying binoculars
Glass or porcelain dish
for wet sterilizer

³ Supplies that come in contact with the patron in this and every other manipulative procedure must be sterile.

Needles	Alcohol
Epilation forceps	Witch hazel
Pliers for insertion of needle into holder	Antiseptic powder
Adjustable lamp	Calamine lotion

Preparing the patron.

1. Seat the patron. Adjust the chair to a comfortable reclining or sitting position, depending upon the area from which the hairs are to be removed. Cover patron's clothing with chair cloth.
2. Cover the patron's eyes with witch hazel pads or a folded towel.
3. Wash and sterilize your hands.

Preparing for the epilation.

1. Place a folded towel conveniently for epilated hairs. Cotton may be placed on the towel to receive the hairs.
2. Examine the area to be treated with the binocular magnifiers to ascertain the slant of the hair follicle and the texture of the hair. (The magnifiers are also used to watch the progress of the epilation.)
3. Test for polarity.
4. Remove the needles from the wet sterilizer with pliers and insert them in the needle holders. (From six to eight needles are usually used.) Attach the needle holders to the conducting cord of the negative pole. Attach the carbon electrode, covered with wet cotton, to the positive pole and place it in the patron's hand.
5. Adjust the operating arm of the machine to within three or four inches above the area from which the hairs are to be epilated.

Performing the epilation.

1. Cleanse the patron's skin with alcohol. Be sure that the skin is thoroughly dry before turning on the switch.
2. Turn on the switch.
3. Insert the first needle, the one farthest away from your-

self. Place the needle at the entrance of the follicle, and, following the slant of the hair, which is usually from 25 to 45 degrees, with a rotary motion, and without force, proceed down the follicle until the papilla is reached.

4. Turn on the rheostat. The strength of current, depending upon the make of the machine, for the average skin is one-tenth of one milliampere for each needle used. If the hair is coarse, or the growth heavy, the amperage may be raised. If the machine is not equipped with a milliampere meter, then follow the instructions of the manufacturer of the machine.
5. Insert the second needle in the same manner, not too close to the first one. The current or amperage should be increased one-tenth to one-fifth of a milliampere after the insertion of each needle. After the last needle has been inserted, allow an elapse of about one and one-half minutes before proceeding with the removal of the first needle, depending upon the appearance of the surrounding tissues. The length of time for a needle to remain inserted depends upon the texture and resistance of the hair and the strength of current used.
6. Remove the needles carefully with a gentle rotary motion, in the order in which they were inserted. (The first needle inserted is the first to be removed, and so on, until all the needles have been removed.) Grasp the hair with the epilation forceps, and place the hair on the cotton or towel. Never pull the hair; if the decomposition of the papilla has taken place, the hair will not require pulling to remove it. If the hair does not come out easily, reinsert the needle, increase the current slightly, and leave the needle inserted for about one-half to one minute longer. If the hair is very resistant, make a third insertion. If it is unsuccessful, and if the tissue has not been destroyed, remove the needle, and epilate the hair with the forceps. Insert the needle, raise the current slightly, and leave the needle inserted for about one-half minute to decompose the papilla.

7. Insert the first needle into another follicle, and continue this process with all the needles until the treatment is completed.

Note. Lower the amperage after the removal of each needle in the same proportion as it was raised after the insertion of each needle.

8. Turn the rheostat and switch to zero and remove the carbon electrode from the patron's hand. Lift the operating arm away from the working position.

Completing the treatment.

1. Perform cataphoresis. Give the patron the electrode, covered with wet cotton and attached to the negative conducting cord, and move the facial electrode, covered with cotton saturated with alcohol or calamine lotion and attached to the positive conducting cord, over the treated area to contract the pores and to reduce any swelling that may result from the removal of the hairs.
2. Dust with antiseptic powder, if the patron desires.
3. Advise the patron as to home treatment. No soap, water, or cosmetics should be used on the skin for at least twenty-four hours. The hands and fingers must be kept away from the treated area. The patron should sponge the area frequently with alcohol or calamine lotion, and should use an antiseptic ointment to relieve any pain and reduce redness.

Clean up.

1. Fold and put away chair cloth.
2. Sterilize needles, forceps, and pliers, and place in the cabinet sterilizer.
3. Place cotton with epilated hairs in waste container, and soiled towels in covered container.
4. Wash and sterilize your hands.

Questions

1. What is hypertrichosis?
2. Give some causes of superfluous hair.

3. By what methods may superfluous hair be removed?
4. By what methods may hair be removed temporarily from the skin?
5. After removing hair by tweezing or depilatories, why will the hair grow again?
6. In order to remove hair by a temporary method, what knowledge should an operator have?
7. What abilities should an operator have in order to remove hair by tweezing and depilatories?
8. Why should sterile tweezers be used?
9. How may the expression of the face be changed by arching the brows?
10. What natural line should be followed when giving an arch?
11. What should be determined before giving an arching tweeze?
12. When giving a tweeze, how should you hold the skin?
13. In what direction should the hair be pulled?
14. For what purpose is an eyebrow pencil used when giving an arching tweeze?
15. How should you protect the patron's eyes when working on the brows?
16. Briefly describe an arching tweeze.
17. What is a depilatory?
18. In what forms do depilatories come?
19. On what parts of the body are depilatories used?
20. How are paste and powder depilatories applied?
21. What is the action of powder and paste depilatories on the hair?
22. What is the difference between the action of a paste depilatory and that of a wax epilatory?
23. How is a wax epilatory applied? How is it removed?
24. What precaution should be used when using wax on a sensitive skin?
25. Briefly describe a paste depilatory arch.
26. Describe the process of arching the brows with wax.

27. How may the temperature of the wax be tested?
28. Why should sterile instruments and standard supplies be used when working on the eyebrows?
29. How should the tweezers be kept when not in use?
30. Why should hair not be removed from inflamed or irritated skin tissues?
31. Should an arch be given before an eyebrow dye?
32. What precaution should be used when applying wax?
33. Name some astringents that may be applied after a tweeze or wax arch.
34. What is electrolysis?
35. In what way is electrolysis used in cosmetology?
36. Define electrologist.
37. How is hair removed safely and permanently?
38. What form of electric current is used in electrolysis?
39. Why is pressure on the needle not necessary in removing hair by electrolysis?
40. Is epilation of hair by electrolysis a painful process?
41. Under what circumstances should the electric needle not be used?
42. Name the hair structures that are destroyed by electrolysis.
43. Describe a hair follicle. A hair papilla.
44. What living structure must be completely destroyed before a hair will grow again?
45. What is the objective in view when the electric current is applied to the follicle and papilla?
46. Name the subjects that should be studied before an operator should attempt to practice the destruction of living tissue.
47. What physical characteristics are necessary, and what special knowledge should an operator have before performing electrolysis?
48. What abilities should she possess?
49. Name the two methods used in electrolysis.
50. How is the single-needle method used?
51. Briefly describe the process of removing hair by the multiple-needle method of electrolysis.

52. What advantage has the multiple-needle method over the single-needle method?

53. Why is more experience necessary in order to use the multiple needle correctly and safely?

54. Of what does equipment for electrolysis consist?

55. How should electrodes be prepared before using?

56. For what purpose are pliers used? Epilation forceps?

57. Why is a magnifying glass necessary?

58. What kinds of needles are used?

59. Why should a needle with a sharp point not be used?

60. Why should the needle be inserted with great caution? How may a scar be made?

61. What would you do if a slight hemorrhage should occur?

62. Should a test for polarity be made?

63. To which pole is the electrode held by the patron connected?

64. How is the electric circuit completed?

65. Under what circumstances is a wrist electrode used?

66. How are needles, forceps, and pliers sterilized?

67. How should needles be removed from the sterilizing solution?

68. For what purpose is the skin sponged with alcohol before an epilation?

69. Why should the skin be perfectly dry before using an electric current for the removal of hair?

70. How should the needle be inserted into the follicle?

71. How much force should be used in inserting the needle?

72. What does the appearance of bubbles around the needle indicate?

73. Do bubbles of hydrogen gas always appear?

74. Under what circumstances will the hair be easily withdrawn?

75. If the hair does not come out readily, what procedure should be used?

76. Upon what does the strength of the current depend?

77. Upon what factors does the length of time which the needle should remain in the follicle depend?

78. Which hair texture requires more time, coarse or fine?
79. Should a hair be removed near an eruption or abrasion of the skin?
80. Should the needle *always* be connected to the negative pole?
81. Should hair be removed from a birthmark?
82. Should the needle ever be connected with the positive pole?
83. What advice should be given to the patron for home treatment?
84. Describe the procedure of the removal of hair by electrolysis.
85. How is cataphoresis employed in finishing the treatment?

Chapter XXIII

BODY CONTOURING

Body contouring, sometimes called body culture or recon-touring, is the restoration of a lost form to a part—"contour" in this sense meaning the normal outline of the body or one of its parts. A body-contouring treatment is given as a general health service which belongs rightfully in the field of cosmetology. Upon the health of the body depends the health of the skin, hair, and nails.

A body-contouring treatment consists of placing the patron in a bath cabinet, usually for from 10 to 40 minutes, during which time the body is subjected to steam, with or without therapeutic lights, and following with a body massage for from 30 to 45 minutes and a facial and make-up.

The treatment should be relaxing and refreshing, and may accomplish some or all of the following results:

1. Increase the circulation of the blood and lymph.
2. Relax or stimulate the nervous system, depending upon the kind of manipulations given.
3. Stimulate the respiratory functions of the skin.
4. Stimulate the organs of elimination of the whole body to greater activity.
5. Restore muscle tone.
6. Relieve muscular stiffness and fatigue.
7. Improve the condition of stiff and painful articulations.
8. Relieve congestion in a tissue or part.
9. Reduce the size of a part by breaking down fat cells for elimination by the lymphatic system.
10. Build up a part by restoring health to body tissues.

Body-contouring treatments are usually given in a series of twelve treatments, spaced at about three each week. They

should be recommended for slenderizing the figure by weight reduction, and for developing the figure by building up flesh. Conditions in which the body needs more active functioning of its organs of elimination, and cases of nervousness, rheumatism, arthritis, colds, insomnia, stiff muscles and joints, and the like, should be treated in a beauty shop only upon the advice of the patron's physician. An operator cannot diagnose a condition or prescribe a treatment for it. Physicians realize the value of hydrotherapy and massage for certain abnormal conditions and often refer patients to establishments where this service is available.

To give a body-contouring treatment scientifically, an operator should be familiar with the contents of the following chapters of this book:

- Chapter III. Cells and Tissues
- IV. The Skeletal System
- V. The Muscular System
- VI. The Nervous System
- VII. The Circulatory System
- VIII. The Skin
- X. Diseases and Abnormal Conditions of the Skin, Hair, and Nails
- XI. Sterilization and Sanitation
- XIII. Electricity in Cosmetology

An operator should also have a **knowledge** of: the laws governing the practice of physiotherapy in her state¹; the rules of the State Boards of both Cosmetology and Public Health; the normal temperature of the body; the normal pulse rate of adults, male and female; hydrotherapy, including electric and steam bath equipment, showers and sprays, and the effects of moist and dry heat on body tissues; light therapy, including ultraviolet and infrared rays and their effects on the body; and the principles of massage and its physiological effects on the muscular, nervous, and circulatory systems.

An operator should have the **ability**: to practice all safety

¹ Some states require a license in physiotherapy, which is referred to in some state laws as *physical therapy*.

precautions; to sterilize and care for equipment; to use equipment correctly, including all kinds of bath cabinets and therapeutic lights; to use a clinical thermometer; to take the pulse of a patron; to weigh and measure a patron correctly; to keep an accurate record card; to give body massage scientifically; and to give any type of facial treatment and make-up.

Physiotherapy is the use of light, heat, air, water, and exercise for remedial purposes. A physiotherapist should have the ability to give Russian and Turkish baths, Sitz and medicated baths, salt-glow treatments, hot packs and compresses, cold water packs for the hip, leg, abdomen, arm, neck, and face, and to suggest reducing and body-building diets and exercises.

Hydrotherapy is a method of treating disease by baths, water being the therapeutic agent. The beneficial effects of the external application of water have been proved. Hydrotherapy includes cabinet baths, showers, sprays, compresses and packs, poultices, and so forth. Medicated baths, such as sulphur baths, saline and alkaline baths, pine needle and eucalyptus oil baths, and others, should be given upon the advice of a physician.

Light therapy is the use of lights as therapeutic agents. Infrared and ultraviolet lamps of both the mercury vapor and carbon arc types, are used with cabinet baths to produce enforced excretion of perspiration, and for their physiological effects on body tissues. Therapeutic lights are discussed in Chapter XIII, "Electricity in Cosmetology."

Weight reduction and control. The methods which combine to reduce weight not caused by some pathological condition, without harmful results to the body are hydrotherapy, light therapy, massage, diet, and exercise. Warm, moist heat and infrared rays, accompanied by heavy massage, break down fat cells into waste materials which are eliminated through the skin, respiratory tract, kidneys, and alimentary canal.

Dietetics is the study of the diet and its regulation. Its numerous broad principles include the chemical changes which take place in foods during digestion and metabolism, the composition of foods and their classification into proteins, carbo-

hydrates, and fats, and the importance of vitamins in a balanced diet.

After the patron's weight and measurements have been taken and compared with the table showing the ideal weight and measurements for her age, height, and bone structure, the details of the program for reduction of weight or for body building may be decided upon. Simple and sensible diet and exercise routines may be suggested by the operator, but in the case of an excessive weight-reduction program the patron's physician should be consulted as to the specific procedure to be followed.

Weight-height-age tables represent averages and may be used as a guide up to the age of 30 years, perhaps, when the average person begins to put on weight. A variation of ten pounds above or below the average weight is considered permissible by health experts when the bony and muscular structures are heavier or lighter than those of the average person of the same sex, age, and height.

Bath cabinets, upright and reclining, used in body-contouring treatments are spoken of as vapor bath cabinets, electric bath cabinets, and electric light cabinets. Both moist and dry heat are furnished, or a combination of both. Some electric light cabinets are equipped with ultraviolet and infrared lamps. The lights may be used with or without steam, or the vapor may be used without the lights' being turned on—in which case the patron is surrounded with moist, warm air—or both vapor and lights may be used at the same time. Some bath cabinets are equipped with automatic time clocks and switches for low, medium, and high heat. In the use of a bath cabinet, the instructions of the manufacturer should be closely followed.

Cabinet baths should be given with caution. All persons do not react the same to hydrotherapy and light therapy. The patron's pulse and temperature should be normal, or the bath should not be given. Persons with systemic diseases, such as heart trouble, high blood pressure, and tuberculosis, should take the baths only under the direction of a physician. Highly nervous persons should not be kept in the cabinet so

long as those of a more normal type. If a patron appears nervous when entering a cabinet for the first time, she should not be given a full treatment. Heat applications are soothing and relaxing, and the patron may doze or even fall asleep in the cabinet without any harmful reaction.

Heat stimulates the sudoriferous glands and causes them to pour moisture out upon the surface of the body, and this moisture that is removed should be replaced. The patient should be given water to drink; a mild saline solution may be given, or salt may be added to the water to replace that which has been excreted in the perspiration.

The operator should never leave her patron during a cabinet bath treatment. The patron's temperature may rise, and should therefore be taken during the treatment, according to the instructions of the cabinet manufacturer. The thermometer should be closely watched, as the heat should rise slowly.

Some baths are followed by a shower, an astringent spray, applications of hot towels, salt rubs, and so forth. The patron should be warmly wrapped when relaxing after a cabinet bath.

Equipment for a body-contouring department in a shop depends principally upon the type of bath cabinet used. Besides the usual booth furniture, some of the essentials include: soft washable rugs or paper slippers for bare feet, a set of standard bathroom scales, anatomy charts for the wall, a chart of standard measurements and weights with respect to age and height, a tape measure, an electric blanket or plain blanket, sterile sheets and large towels, alcohol and astringent lotions, and creams and other cosmetics. Large departments are equipped with a gymnasium with stretching bars, weight lifts, stationary bicycles, and so forth, sun rooms with sand troughs, and shower rooms with needle showers and a pressure hose.

Record cards should be kept to show the following information: date, name of patron, address, age, occupation, any abnormal physical condition, weight, measurements of body parts—such as arm, leg, hip, bust, thigh, waist, and abdomen—pulse, temperature, and other pertinent details, as well as a record of baths taken, showing number of baths, the time

spent in the cabinet, the patron's temperature and pulse during the bath, the temperature of the cabinet, the reaction of the patron to the treatment, the results of the treatment, and the payment received. Record cards may be made out in duplicate, one copy for the patron and one for the shop. The patron should bring her card for each treatment so that her changed measurements and weight may be recorded.

Body Massage

The principal movements used in massage (effleurage, tapotement, petrissage, vibration, and friction) are described in Chapter XXI, "Facials and Make-Up." In order to practice body contouring, the technique learned in massaging the face, neck, arms, and hands, must be extended to include light and heavy massage of the entire body.

General body massage is based on a thorough knowledge of the structure of the body and the special functions of its tissues and organs, and requires skill in many different movements. Manipulations in body massage are given more vigorously, as a rule, than in facial massage, especially when weight reduction is the goal. The deep kneading and slapping of a part, the wringing of a limb, rubbing to relieve stiffness and pain, vibratory movements on the spine to reduce nervous tension and stimulate the action of internal organs and glands, the building up of weak abdominal muscles to stimulate sluggish intestines, and the breaking down of fat cells in the tissues and deposits in the joints require experience as well as a definite technique.

Massage for body building and for the reduction of an overdeveloped part can accomplish most when massage and diet are combined. When it is desirable to reduce the size of a part of the body, such as the hips and thighs, without affecting the size of the other parts, such as the face, trunk, or upper limbs, heavy massage with the proper diet will be more effective than diet alone, which will affect the body as a whole. Diet without massage may cause a reduction of certain parts when this is neither desirable nor wise.

Effects of Body Massage

On the skeletal system. Bone tissue and cartilage, as well as other body tissues, need a normal blood supply. Massage of the joints, the movements of which include circumduction, flexion, abduction, adduction, supination, and pronation, may reduce many swollen articulations and help restore the parts to normal activity.

On the muscular system. The muscles are exercised and by stimulation of the blood supply metabolism is increased and muscle tone is improved. (*Muscle tone* is the normal degree of tension of a healthy muscle.) Stimulation of voluntary muscle causes an increase in muscular contraction and relieves muscular fatigue by decreasing the waste products present, and thus restores the natural alkalinity of muscle tissue.

On the nervous system. The nerves may be stimulated by massage, with resulting increased activity of body organs and tissues, or they may be soothed and quieted, with consequent relief of irritability and pain.

On the circulatory system. When the flow of blood to a part is increased, fresh oxygen and food are brought to body cells. By hastening the flow of lymph through the vessels of the lymphatic system, the elimination of waste products is increased.

On the respiratory system. Massage strengthens and stimulates the muscles of the respiratory system. Freshly oxygenated blood will be brought to the tissues, and more carbon dioxide will be carried to the lungs for elimination by the breath.

On the digestive system. Massage influences digestion by stimulating the secretions of the stomach, liver, pancreas, and alimentary canal, and restores tone to relaxed and constipated intestines.

On the skin. Massage stimulates the excretory function of the skin, and increases the discharge and flow of perspiration from the sudoriferous glands and of oil from the sebaceous glands. Increase in the blood supply to the hair-making cells

of the hair papilla may improve the health and growth of the hair.

Massage Procedures

Massage procedures may differ, but one of the first essentials in contour massage is that the parts to be reduced or reshaped must be in a perfectly relaxed state. Otherwise, the desired effects cannot be obtained by the compression and percussion movements.

If lymphatic swellings are encountered, the patron should be advised to consult a physician. The swollen areas should not be worked over except under his supervision.

Any expression of discomfort voiced by the patron should not be disregarded. The treatment should not, under any conditions, leave the patron suffering pain, fatigue, or irritation as a result of the operator's work. Massage administered by a well-trained operator will never cause bruising of tissue, no matter how sensitive the patron may be to outside encounters.

One popular massage routine begins with placing the patron on her back. After the cream is applied, the hands and then the arms are massaged, after which the feet, legs, chest, and abdomen are treated in turn. The patron is then placed face downward and the back of the legs and thighs massaged, and the treatment concluded with a thorough back massage and a facial and make-up.

The routine given in the following procedure is also generally used.

BODY-CONTOURING TREATMENT

Supplies.²

Sheets	Small pillow, covered
Blanket, electric or plain	with a slip
Large towels	Alcohol
Bathroom scales	Lotion
Record cards for patron and shop	Cream for massage
Tape measure	Thermometer
	Cosmetics for facial

² Supplies that come in contact with the patron in this procedure must be sterile.

Preparing the patron.

Assist the patron to remove her clothing, and wrap her in a sheet.

Weigh her, and note her weight on a record card.

Measure bust, hips, thighs, and arms, and note these measurements on the record card.

Wash and sterilize your hands.

Take the patron's pulse and temperature.³

Exercises.

If exercises are to be a part of the treatment, they should be taken before the cabinet bath. Give a shower afterward to cleanse the body of perspiration.

Cabinet bath.

Place the patron in the bath cabinet for the required length of time, following carefully the instructions of the cabinet manufacturer as to steaming, drinking water (salt solution), taking the pulse, application of therapeutic lights, and so forth. Give a shower and salt glow. Assist the patron to the massage table.

Giving the massage.

(*Figure 1*) Place the patron face down on the massage table and cover her with a warm, dry towel. Wash and sterilize your hands. Remove the towel and apply cream to the back and to the sides and hips.

(*Figure 2*) Massage the back, proceeding down the spine from the neck to the waist. Return the hands up the sides of the back to the neck, massaging the shoulders and the sides of the body. Repeat three times.

(*Figure 3*) Massage the back with deep kneading manipulations (petrissage) followed by quick chopping movements (tapotement) with the side of the hand. Massage the hips with heavy pressure, using both kneading and chopping movements. Finish the back with light, stroking movements (effleurage) down the spine from the neck

³ The normal pulse rate of an adult female is 80; of an adult male, 75. The normal body temperature is 98.6° F.

to the waist to relax the muscles. Remove the cream and apply alcohol or an astringent lotion. Cover the back with towels or a sheet.

(*Figure 4*) Apply cream to the legs from the hips to the feet. Massage the right foot, rotating the toes and ankle, and massage the arch. Massage the leg, and finish with a twisting movement.

(*Figure 5*) Massage the right leg from the hip to the foot with rapid chopping and slapping movements (tapotement). Bend the leg backward toward the hip. Finish the leg massage with stroking movements (effleurage) and cover with towels or a sheet. Remove cream and apply astringent lotion or alcohol. Massage the left foot and leg in the same manner.

(*Figure 6*) Turn the patron on her back and place a small pillow under her knees. Massage the arms, with the same movements used for the legs, vibrating on nerve centers, from the wrist to the shoulder. Massage the right arm and then the left arm.

(*Figure 7*) Massage each finger with rotary movements. Remove cream from arms and fingers, and apply alcohol or astringent lotion.

(*Figure 8*) Lift the knees and knead the center of the abdomen with gentle movements. Vibrate over the entire surface of the abdomen. Remove the cream and apply alcohol or astringent lotion.

(*Figure 9*) Remove make-up with cleansing cream. Apply night cream or massage oil to chest, neck, and face. Massage the chest with a rotary motion. Gently twist the neck from side to side and stretch.

(*Figure 10*) Massage the neck from chin to ear. Cup and slide the fingers over the shoulders. Repeat three times.

(*Figure 11*) Rotate over the chin, lift the corners of the mouth, rotate around the base of the nose, and move upward to the eyes. Gently massage around the eyes and across the forehead.

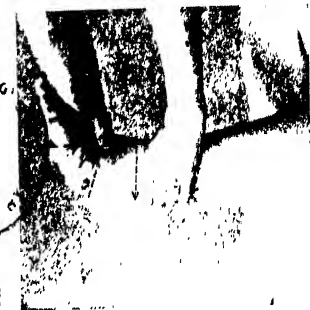
Note. The facial massage routine described in Chapter XXI, "Facials and Make-Up," may be used instead of the one given above.



1. Patron is made comfortable on massage table, a towel is placed over her back. Night cream is smoothed over back.
2. Back is massaged with firm pressure from nape of neck to waist; hands spread over hips and the body is rocked.



3. With fingers and thumbs, the back is kneaded with a pulling, back and forth motion.



4. Legs are massaged, manipulated with twist motion.



5. Rapid slapping motion with the edges of the hands is used on the leg from hip to foot.

FIG. 27. A BODY-CONTOURING TREATMENT

Photos on pages 348 and 349 courtesy of "Modern Beauty Shop Magazine."

Completing the treatment.

Allow the patron to rest with witch hazel pads over the eyes. Apply street make-up as described in Chapter XXI, "Facials and Make-Up." Take the patron to the dressing room and assist her with her clothing and shoes.

Clean up.

1. Put away supplies.
2. Place used towels and sheets in covered container.
3. Fill out record card.
4. Prepare the cabinet bath and massage table for the next patron.

Questions

1. What is body contouring?
2. By what other names is body contouring known?
3. For what general purpose is a body-contouring treatment given?
4. In what way does body contouring belong in the field of cosmetology?
5. Of what, briefly, does a body-contouring treatment consist?
6. What beneficial results may be accomplished by a body-contouring treatment?
7. How may the size of a body part be reduced?
8. How may a body part be built up?
9. How often should body-contouring treatments be given?
10. Name some conditions which should not be treated in the shop without consulting a physician.
11. With what special subjects should an operator be familiar in order to give a body-contouring treatment?
12. What special knowledge should an operator have in order to give a body-contouring treatment correctly?
13. Can treatments be given in all states without a special license?
14. What abilities should an operator possess in order to give a treatment scientifically?

15. What is physiotherapy? What kinds of treatments are given by a physiotherapist?
16. What is hydrotherapy?
17. What practices does hydrotherapy include?
18. What is light therapy?
19. For what principal purposes are therapeutic lamps used in hydrotherapy?
20. What is the study of the diet and its regulation called?
21. What does the study of dietetics include?
22. Should a program for excessive weight reduction be attempted without the advice of a physician?
23. What do weight-height-age tables represent? How much variation from the standard in weight is considered normal by health experts?
24. By what other names are bath cabinets called?
25. Describe the different types of bath cabinets.
26. Why should cabinet baths be given with caution?
27. Should a cabinet bath be given if the patron's pulse and temperature are not normal?
28. What rule should you follow when giving a bath to a highly nervous patron?
29. What is the effect of heat applications on body tissues?
30. Why is a mild saline solution given to the patron during a treatment?
31. Why should the operator never leave her patron during a cabinet bath?
32. How may the moisture and heat of the bath affect the body temperature? What is the normal body temperature? The normal pulse rate?
33. What equipment is necessary for a body-contouring department in a shop?
34. What information should a patron's record card show?
35. Upon what principles is general body massage based?
36. What is the principal difference between body massage and facial massage?

37. What effects may be produced by vibratory massage on the spine?

38. How may sluggish intestines be stimulated?

39. How may stiff joints be affected by massage?

40. Why are diet and massage combined more efficacious than weight reduction by diet alone?

41. What is the difference in effect on the body of diet with massage and diet without massage?

42. What is the effect of body massage on the skeletal system?

43. How does massage affect the muscular system?

44. How does massage affect metabolism? Muscle tone?

45. In what ways does massage affect the nervous system?

46. What is the effect of massage on the circulatory system?

47. How does massage assist the lymphatic system in its function of elimination of waste products?

48. What is the effect of massage on the respiratory system? The digestive system?

49. Which one of the functions of the skin is stimulated most by the movements of massage?

50. How may massage improve the health and growth of the hair?

GLOSSARY¹

- abducens** (ăb-dŭ'sěnz): the sixth cranial nerve.
- abduct** (ăb-dŭkt'): to draw away from a neighboring part or limb.
- abnormal** (ăb-nôr'măl): departing from the usual structure or condition.
- abnormality** ('-i-tĭ): state of being abnormal; irregularity.
- abrasive** (ăb-ră'siv): tending to rub or scrape off.
- abscess** (ăb'sěs): a localized collection of pus in a tissue of the body.
- absorbent** (ăb-sôr'běnt): anything which absorbs.
- accessory** (ăk-sěs'ô-rĭ): adding or contributing in a secondary way.
- acetic** (ă-sě'tik) **acid**: the acid of vinegar.
- acid** (ăs'id): a solution of a substance containing hydrogen ions which can be replaced by a metal or a base.
- acne** (ăk'nē): an inflammatory disease of the sebaceous glands.
a. indura'ta: acne vulgaris with hardening of the tissues. **a. puncta'ta**: in which the lesions are pointed pustules in the center of which are blackheads. **a. rosa'cea**: a chronic inflammation of the face, especially the nose. **a. vulga'ris**: common acne.
- adduct** (ă-dŭkt'): to draw toward the axis of the body.
- adipose** (ăd'i-pôs) of or pertaining to animal fat.
- afferent** (ăf'ěr-ěnt): conducting inward to a part or organ.
- agnail** (ăg'nāl): a hangnail.
- ala** (ă'lă): a winglike process or part.
- alae nasi** (ă'lē nă'sĭ): the wings of the nose.
- albinism** (ăl'bĭ-nĭz'm): whole or partial absence of pigmentation.
- alcohol** (ăl'kô-hôl): a colorless, volatile, inflammable liquid obtained by fermentation.
- alkali** (ăl'kă-lĭ): a compound which has the property of neutralizing acids, and the presence of which can be discovered through its action on litmus.
- alkaline** (-lĭn): pertaining to or having the properties of an alkali.
- allergen** (ăl'ěr-jěn): any substance capable of inducing a condition of allergy.
- allergia** (ăl'ěr'jē-ah): specific susceptibility to a substance.
- alopecia** (ăl'ô-pě'shě-ă): baldness; deficiency of hair. **a. adna'ta**: congenital baldness. **a. area'ta**: baldness occurring in patches. **a. praematu'ra**: premature baldness. **a. seni'lis**: the baldness of old age. **a. symptomat'ica**: baldness occurring after fevers or in the course of some disease.

¹ Definitions are limited to the sense in which the word is used in this book.

- alternating** (ăl'tēr-nāt'īng) **current**: electric current reversing periodically and rapidly its direction of flow; changing from the positive to the negative direction and back again. Commonly designated "A.C."
- alum** (ăl'ŭm): a colorless, crystalline substance with styptic properties.
- amitosis** (ăm''ī-tō'sīs): direct cell division.
- ammonia** (ă-mō'nī-ă): a colorless, gaseous compound of hydrogen and nitrogen; NH_3 .
- amoeba** (ă-mē'bă): a minute one-celled protozoan animal organism; also the genus or class of such organisms.
- amoeboid** ('-boid): like an amoeba; movements exhibited by the white corpuscles of the blood.
- ampere** (ăm-pâr'): practical unit of electrical current.
- amyl acetate** (ăm'il ăs'ē-tăt): banana oil; used as a solvent in nail polishes.
- analysis** (ă-năl'ī-sīs): resolving into its parts or elements.
- anaphoresis** (ă-năf''ō-rēsīs): the forcing of liquids into the tissues.
- anatomy** (ă-năt'ō-mī): the science which treats of the structure of animals and plants.
- angiology** (ăn-jē-ōl'ō-jī): the sum of knowledge regarding the blood and lymph vessels.
- angular** (ăn'gŭ-lâr): terminal branch of the external maxillary artery.
- anhidrosis** (ăn'hī-drō'sīs): absence or deficiency of the secretion of sweat.
- aniline** (ăn'ī-līn): a colorless, oily liquid from coal tar and indigo, used in the manufacture of various dyes.
- annular** (ăn'ŭ-lâr): ring-shaped. **a. finger**: the ring finger.
- anode** (ăn'ōd): the positive pole of a galvanic battery or other electric source.
- anomaly** (ă-nôm'ă-lī): deviation from the common rule.
- anterior** (ăn-tē'rī-ēr): before; situated in front of or in the forward part of.
- anthrax** (ăn'thrăks): a carbuncle.
- antibody** (ăn'tī-bōd'ī): a substance in the blood and tissue juices which acts in antagonism to harmful foreign bodies, such as bacteria-producing toxins.
- antidote** (ăn'tī-dōt): a remedy for counteracting the effects of a poison.
- antiseptic** (ăn'tī-sēp'tīk): tending to prevent or arrest putrefaction or pus by destroying or inhibiting the growth of the bacteria.
- antrum** (ă-n'trŭm): a cavity or sinus.
- aorta** (ă-ōr'tă): the great artery which carries the blood from the heart to all parts of the body except the lungs.

- apex** (ā'pěks): the top or pointed extremity of any conical part.
- aponeurosis** (ăp''ō-nū-rō'sīs): a fascia covering and forming the terminations and attachments of certain muscles.
- appendage** (ă-pěn'dáj): a subordinate or subsidiary part or organ; an external organ or limb.
- aqueous** (ă'kwē-ūs): watery; prepared with water.
- areolar** (ă-rē'ō-lăr): fibrous connective tissue containing minute interspaces.
- arrectores pilorum** (ăr''ěk-tō'rēz pī-lō'rŭm): minute involuntary muscle of the skin and hair follicle. Same as **erectores pilorum**.
- arteria septi nasi** (ăr-tē'rē-ă sĕp'tī nāsī): artery of the nose.
- arteriole** (ăr-tē'rī-ōl): any minute branch of an artery.
- artery** (ăr'tēr-ī): one of the vessels through which the blood passes from the heart to the various parts of the body.
- articulation** (ăr-tĭk''ū-lă'shŭn): a joint or juncture between bones of a vertebrate.
- asepsis** (ă-sĕp'sīs): state of being *aseptic*, that is, free from infection.
- asteatosis** (ă-stē''ă-tō'sīs): a deficiency or absence of sebaceous secretion.
- astringent** (ăs-trĭn'jĕnt): an agent that tends to contract or draw together organic tissues and arrests discharges of blood, mucus, and so forth.
- atom** (ăt'ŭm): one of the minute particles which enters into the composition of a molecule.
- atrachia** (ă-trĭk'ĭ-ă): absence or lack of hair.
- atrium** (ă'trī-ŭm): a cavity or passage; an auricle of the heart.
- atrophy** (ăt'rō-fī): a wasting away from insufficient or improper nourishment; a diminution in the size of a part.
- attollens** (ăt-tōl'lĕns): a muscle that raises or lifts. **a. aurem** (ô'r'ĕm): muscle of the ear.
- attrahens** (ăt'ră-hĕns): a muscle that elevates, draws, or pulls toward. **a. aurem**: muscle of the ear.
- auditory** (ô''dī-tō-rī): the eighth cranial nerve; the nerve of hearing.
- auricle** (ô'rī-k'l): one of the chambers of the heart; also, the external ear.
- auricular** (ô-rĭk'ŭ-lăr): of or pertaining to the ear or the sense of hearing. **a. artery** (posterior): artery of the back of the ears and the scalp. **a. glands** (posterior): the glands which receive lymph from the parietal lymph vessels. **a. nerves**: great auricular nerve of the face, ear, and neck; post auricular nerve of the occipitalis muscle. **a. temporal nerve**: the nerve which affects the temple and pinna.
- auricularis** (ô-rĭk'ŭ-lă'rīs): muscle of the ear.

- autoclave** (äw'tō-klāv): an apparatus for effecting sterilization by steam under pressure.
- autonomic** (ô'tō-nōm'īk): having self-controlling functions.
- axilla** (äk-sīl'ä): the armpit.
- axillary** (-lā-rī) **artery**: that part of the artery of the arm that lies in the axilla.
- axon** (äk'sōn): the process of a nerve cell which conducts impulses away from the cell body.
- bacillus** (bā-sīl'lūs): a rod-shaped bacterium often producing disease.
- bacteria** (bāk-tē'rī-ä): minute, one-celled organisms; microbes; microorganisms.
- bactericide** (-sīd): an agent that destroys bacteria.
- barba** (bār'bah): (*Latin*) the beard.
- barber's itch**: tinea sycosis; a disease of the bearded parts of the face.
- barium sulphide** (bā'rī-ŭm sŭl'fīd): a yellowish powder used in making depilatory preparations.
- base** (bās): the chief ingredient of a compound.
- basilic** (bā-sīl'īk) **vein**: the vein of the upper arm.
- battery** (bāt'ēr-ī): an apparatus for generating voltaic electricity.
- beneficent** (bē-nēf'ī-sēnt): doing or producing good.
- benzoin** (bēn'zoin): a white crystalline substance obtained from oil of bitter almonds and some other sources.
- biceps brachii** (bī'sēps brāk'ī-ī): muscle of the arm.
- bichloride** (bī-klō'rīd): *see* corrosive sublimate.
- binding post**: a metallic post for making electrical connections.
- bleach** (blēch): to make white or whiter.
- bleb** (blēb): any skin vesicle filled with fluid.
- blemish** (blēm'īsh): any mark or deformity or injury; anything that diminishes beauty.
- blood** (blŭd): the fluid which circulates through the heart, arteries, and veins carrying food and oxygen to the body cells.
- bone** (bōn): one of the pieces or parts of the skeleton of a vertebrate.
- borax** (bō'rāks): a crystalline salt, used as a cleansing agent, antiseptic, and so forth.
- brachial** (brāk'ki-āl): pertaining to the arm. **b. artery**: the chief artery of the upper arm.
- brain** (brān): the mass of nervous material enclosed within the cranium, including the cerebellum.
- bromidrosis** (brō'mī-drō'sīs): fetid perspiration.
- buccal** (bŭk'āl): of or pertaining to the cheeks. **b. glands**: lymphatic glands situated near the buccal muscle. **b. nerve**: the nerve which affects the buccinator and orbicularis oris muscles.

- buccinator** (bŭk'sī-nā'tēr): muscle of the cheek.
- bulbous** (bŭl'bŭs): bulblike in shape or structure.
- bulla** (bōōl'á): a vesicle; a bleb; an elevation of the cuticle containing watery fluid.
- calamine** (kāl'ā-mīn): a native zinc carbonate, pulverized and used as a dusting powder.
- calcium** (kāl'sī-ŭm): a silvery-white metal; the basic element of lime.
- callus** (kāl'ŭs): a circumscribed, hardened thickening of the skin.
- camomile** (kām'ō-mīl): a plant, an infusion of the dried leaves of which is used as a rinse for the hair.
- cancellous** (kăn'sē-lŭs): having a spongy or porous structure.
- canities** (kă-nīsh'ī-ēz): gray or white hair.
- capillary** (kăp'ī-lā-rī): a minute vessel which connects an arteriole with a venule.
- capilli** (kā-pīl'ī): the hair of the head.
- capitate** (kăp'ī-tăt): headlike in form.
- carbon dioxide** (kăr'bŏn dī-ŏk'sīd; -sīd): carbonic acid gas. It is formed in the tissues by the oxidation of carbon and is excreted by the lungs.
- carbuncle** (kăr'bŭn-k'l): a local inflammation of the subcutaneous tissue. **malignant c.:** malignant anthrax in man.
- cardiac** (kăr'dī-ăk): pertaining to or situated near the heart.
- carotid** (kăr-ŏt'īd): the principal artery of the neck.
- carpal** (kăr'pāl): of or pertaining to the carpus (wrist); a carpal bone.
- cartilage** (kăr'tī-lāj): the gristle or elastic substance attached to articular bone surfaces. **hyalin** (hī'ā-līn) **c.:** cartilage which has a granular matrix with little fibrous tissue, and is glossy and transparent.
- catabolism** (kā-tăb'ŏ-līsm): destructive metabolism; passage of tissue material from a higher to a lower plane of complexity.
- cataphoresis** (kā-tăf'ŏ-rēs'is): electric osmose or osmosis used in introducing drugs into the body.
- cathode** (kăth'ŏd): the negative terminal of an electric source.
- caustic** (kŏs'tīk): a corrosive agent.
- cavity** (kăv'ī-tī): a hollow space within the body or in one of its organs.
- cell** (sĕl): one of the units of structure which make up organic tissue in animals and plants. **cell body:** that portion of the cell which encloses the nucleus. **cell wall:** the outer covering of the cell. **cell division:** the process by which cells multiply.
- cellular** (-ŭ-lăr): pertaining to a cell or cells.
- cephalic** (sē-făl'īk) **vein:** the vein of the upper arm.

- cerebellum** (sěř''ē-běľ'ŭm): a division of the brain.
- cerebrospinal** (sěř''ē-brō-spī'nāl): pertaining to the brain and spinal cord.
- cerebrum** (sěř''ē-brŭm): the main portion of the brain.
- cervical** (sŭr'vī-kāl): of or pertaining to the neck.
- characteristic** (kăr''āk-těr-is'tik): distinguishing; marking specifically.
- characterize** (-iz): to make recognizable by peculiar marks or traits.
- chemical** (kěm'i-kāl): of or pertaining to chemistry. **c. change**: a change in composition, producing a new substance with new properties. **c. equation**: the abbreviated form used to express the facts of a chemical change. **c. reaction**: a chemical transformation or change.
- chemistry** (kěm'is-trī): the science which treats of matter considered as composed of atoms and their relations and affinities.
- chloasma** (klō-áz'mā): a term applied to pigmentary skin discolorations.
- cholesterin** (kō-lěs'těr-ĭn) or **cholesterol**: a fatlike substance found in animal tissues and secretions, being present in lanolin; used as an emulsifier in cold creams.
- chromatin** (krō'mā-lĭn): a substance found in the nucleus of a cell; the stainable portion of the cell nucleus.
- chromosome** (krō'mō-sōm): one of the small bodies into which the chromatin of the cell nucleus divides previous to mitotic cell division.
- chronic** (krŏn'ĭk): long-continued; not acute.
- cicatrix** (sĭ-kā'trĭks): a scar; the mark left by a sore or wound.
- cilia** (sĭl'i-ā): the eyelashes.
- citric acid** (sĭt'rĭk): an acid extracted from lemons, currants, and the like.
- clavicle** (klāv'ĭ-k'l): the collar bone.
- cleido** (klĭ'dō): pertaining to the clavicle and hyoid.
- coagulate** (kō-ăg'ŭ-lăt): to change from a liquid to a thickened, curdlike state by a chemical reaction.
- coccus** (kŏk'ŭs): a spherical cell, such as those of the bacteria of the genus micrococcus.
- combustion** (kŭm-bŭs'chŭn): the act or process of burning.
- comedo** (kŏm'ē-dō): a blackhead.
- communicable** (kŏ-mŭ'nĭ-kă-b'l) **disease**: one that may be passed from one person to another.
- compact** (kŏm'păkt): to press closely together; to consolidate, as the parts which comprise the body.
- compound** (kŏm'pound): composed of two or more parts or ingredients.

- compressor** (kǒm-prēs'ēr): a muscle that compresses certain parts.
c. narium (nā'rī-ŭm) and **c. narium minor**: muscles of the nostrils.
- concave** (kǒn'kāv): presenting a curved or rounded surface.
- concentrate** (kǒn'sēn-trāt): to condense; to increase the strength, as of a liquid, by diminishing the bulk.
- conductor** (kǒn-dŭk'tēr): a substance capable of readily transmitting heat or electricity.
- congeal** (kǒn-jēl'): to become solid or viscid; to coagulate or curdle.
- congenital** (kǒn-jēn'ī-tāl): existing at or before birth.
- congestion** (kǒn-jēs'chŭn): excessive or abnormal accumulation of blood in a part.
- constituent** (kǒn-sīt'ŭ-ēnt): that which constitutes or composes, as a part or an element.
- constitutional** (kǒn'stī-tŭshŭn-āl) **disease**: a disease belonging to or inherent in the constitution or structure of the body.
- constrict** (kǒn-strīkt'): to draw together; to contract.
- contagious** (kǒn-tā'jŭs): transmitted from one person to another.
- contaminate** (kǒn-tām'ī-nāt): to corrupt by touch or contact.
- contour** (kǒn'tōor): the outline of a figure or a body.
- contractility** (kǒn'trāk-tīl'ī-tī): the quality of shrinking or contracting.
- contraction** (kǒn-trāk'shŭn): the shortening of a muscle, or a muscle fiber, when in action.
- convex** (kǒn'vĕks): having a rounded and elevated surface.
- copious** (kō'pī-ŭs): having an abundance; profuse.
- coracobrachialis** (cōr'ā-kō-brāk'ī-ā'lis): muscle of the upper arm extending between the coracoid process and the humerus.
- corium** (kō'rī-ŭm): the derma or true skin.
- corneum** (kōr'nē-ŭm): the stratum corneum of the skin, the outer layer of the epidermis.
- coronal** (kōr'ō-nāl): pertaining to the crown of the head. **c. suture**: that formed by the union of the frontal bone with the two parietal bones.
- coronary** (kōr'ō-nā-rī): encircling in the manner of a crown; applied to blood vessels, nerves, and so forth.
- corpuscle** (kōr'pŭs-'l): a minute particle of protoplasm; a small body composed of many cells.
- corrosive** (kō-rō'sīv): having the power of wearing away. **c. sublimate**: a powerful antiseptic; a virulent poison; bichloride of mercury.
- corrugation** (kōr'ōo-gā'shŭn): a groove of a wrinkled surface.
- corrugator** (kōr'ōo-gā-tōr): a muscle which wrinkles. **c. supercilii** (sŭ'pēr-sīl'ī-i): one of the small muscles that wrinkle the eyebrows.

- cortex** (kôr'těks): the outer layers of an organ; in particular, the gray matter of the brain.
- cortical** (kôr'ti-kāl): of or pertaining to or consisting of cortex.
- cosmetic** (kōz-mět'īk): a beautifying preparation or substance.
- cosmetology** (kōz'mět-ōl'ō-jē): the study of the care and beautifying of the body.
- counteract** (koun-tēr-ăkt'): to act in opposition to; to neutralize.
- cranium** (krā'nī-ŭm): the skull or brain case of a vertebrate.
- cresol** (krēs'ōl): a colorless, oily fluid from coal tar and wood tar, used as a disinfectant.
- crust** (krŭst): an outer layer of dried secretion.
- cuneiform** (kū-nē'i-fōrm) **bone**: wedge-shaped bone of the wrist.
- cutaneous** (kū-tā'nē-ŭs): of or pertaining to the skin.
- cuticle** (kū'ti-k'l): the outer skin; the epidermis.
- cutis** (kū'tis): the derma or true skin.
- cyst** (sĭst): a pouch or sac without an opening.
- cytoplasm** (sĭt'ō-plāz'm): the protoplasm of a cell exclusive of the nucleus.
- dandruff** (dăn'drŭf): scales formed upon the scalp.
- d'Arsonval** (d'ăr'sōn-vāl) **current**: an electric current of high frequency and low amperage employed in the form of autocondensation, autoconduction, and diathermy, named for d'Arsonval, the French physicist.
- decalvant** (dē-kāl'vānt): having the property of making bald, of removing hair.
- decompose** (dē'kōm-pōz'): to decay; to rot.
- deltoid** (dēl'toid): muscle of the shoulder and arm.
- dendrite** (dēn'drīt): a process of a nerve cell.
- deodorant** (dē-ō'dēr-ănt): an agent that destroys odors.
- depigmentation** (dē-pĭg'mēn-tā'shŭn): removal of pigment in tissue.
- depilatory** (dē-pĭl'ā-tō'rĭ): an agent used to remove hair.
- deportment** (dē-pōrt'mēnt): manner of acting; conduct; behavior.
- depressor** (dē-prēs'ēr): a muscle that depresses or draws down a part. **d. alae nasi** (ā'lē nā'sī): the muscle which draws down the ala of the nose. **d. anguli oris** (ăn'gŭ-lĭ ō'rĭs): the muscle which draws down the corners of the mouth.
- derivative** (dē-rĭv'ā-tĭv): anything derived from or deduced from another.
- derma** (dŭr'mā): the layer of skin beneath the epidermis; the corium; the true skin.
- dermatitis** (-tĭ'tis): inflammation of the derma.
- dermatology** (-tōl'ō-jĭ): the science which treats of the skin, its structure, functions, and diseases.
- dermatosis** (-tō'sis): any disease of the skin.

- dermis** (dûr'mîs): the derma.
- detergent** (dê-tûr'jěnt): a substance which cleanses, such as water or soap; a medicine to cleanse wounds.
- deteriorate** (dê-tě'rî-ô-răt): to make inferior in quality or value; to impair.
- device** (dê-vîs'): anything ingeniously conceived; a tool or instrument.
- dialysis** (dî-ăl'î-sîs): separation of substances by diffusion through porous membranes.
- diastole** (dî-ăs'tô-lē): the expansion or dilation of the heart.
- diathermy** (dî-ă-thēr'mî): the generation of heat in the body tissues as a result of the resistance offered by the tissues to high-frequency electric current forced through them.
- differentiate** (dîf'ēr-ĕn'shî-ăt): to acquire individual characters in the process of development.
- digit** (dîj'it): a finger or toe.
- dilate** (dî-lût'): to expand in size; to extend.
- dilator** (dî-lă'tôr): a muscle which dilates a part. **d. naris** (nă'rîs), posterior and anterior: muscles of the nose.
- dilute** (dî-lût'): to make thinner or more liquid by admixture; to thin and dissolve by mixing.
- disinfectant** (dîs'in-fĕk'tănt): an agent for destroying bacteria.
- disintegrate** (dîs-in'tē-grăt): to separate into integrant parts; to decompose.
- dissolve** (dî-zôlv'): to melt away; to cause to pass into solution.
- distal** (dîs'tăl): remote; away from the center of the body.
- dorsal** (dôr'săl): pertaining to the back.
- duct** (dŭkt): any tube or vessel for the passage of excretions and secretions.
- dye** (dî): to stain or color; a product used for staining or coloring the hair permanently.
- eczema** (ĕk'zĕ-mă): an inflammatory skin disease.
- edema** (ĕd-ĕ'ină): swelling due to the accumulation of fluid in the tissues or cavities of the body.
- efferent** (ĕf'ĕr-ĕnt): conveying blood or secretion away from a part.
- efficacious** (ĕf'î-kă'shŭs): effective; power to produce the intended effect.
- effilate** (ĕf'î-lăt): to cut hair with a slithering or sliding movement of the shears.
- effileing** (ĕf'î-lîng): tapering the hair; slithering.
- effleurage** (ĕ-flôŭ'răj): a stroking movement used in massage.
- elastic** (ĕ-lăs'tîk): springy; capable of recovering size and shape after stretching.

- electricity** (ē-lĕk-trīs'ī-tī): an agency to which are due various magnetic, chemical, and thermal effects. **dynamic** (dī-nām'īk) e.: applies to electricity in motion. **static** (stăt'īk) e.: the electricity of stationary charges. **voltaic** (vōl-tā'īk) e.: current or dynamic electricity; electricity in action.
- electrode** (ē-lĕk'trōd): either terminal of an electric source; it may be a plate, wire, or other conducting object.
- electrology** (ē-lĕk-trōl'ō-jī): the science of the phenomena and properties of electricity.
- electrolysis** (ē-lĕk-trōl'ī-sīs): chemical decomposition produced by a direct current of electricity.
- electrolytic** (ē-lĕk-trō-līt'īk) **cup**: an appliance used to cleanse and massage the skin.
- electron** (ē-lĕk'trōn): the unit or atom of negative electricity.
- electrotherapy** (ē-lĕk-trō-thēr'āp-ī): treatment of disease by electricity.
- electrothermal** (-thūr'māl): referring to, or combining, both heat and electricity.
- element** (ĕl'ē-mĕnt): a substance that has not been decomposed into similar substances.
- emollient** (ē-mōl'yĕnt): an agent which softens or soothes the skin.
- emulsion** (ē-mŭl'shŭn): an oily or resinous substance divided and held in suspension through the agency of an adhesive, mucilaginous, or like substance.
- endocardium** (ĕn'dō-kār'di-ŭm): a thin, sac-like membrane lining the cavities of the heart.
- endocrine** (ĕn'dō-krīn): secreting internally; applied to organs which secrete substances into the blood and lymph.
- endoneurium** (ĕn'dō-nŭr'i-ŭm): areolar connective tissues between the fibers of any funiculus (bundle of fibers) of a nerve.
- endosteum** (ĕn-dōs'tē-ŭm): the tissue lining the medullary cavities of bones.
- endothelium** (ĕn'dō-thē'lī-ŭm): the membrane that lines the closed cavities of the body; a layer of thin connective tissue cells.
- environment** (ĕn-vī'rŭn-mĕnt): surrounding conditions which influence or modify.
- enzyme** (ĕn'zīm): a chemical ferment formed by living cells.
- epicranium** (ĕp'ī-krā'nī-ŭm): the structures covering the cranium.
- epicranius** (-ŭs): the occipito frontalis muscle.
- epidermal** (ĕp'ī-dēr'māl): pertaining to the epidermis.
- epidermis** (ĕp'ī-dēr'mīs): the outer epithelial layer of skin; the cuticle or scurf skin.
- epilate** (ĕp'ī-lāt): to remove hair by the roots.
- epithelial** (ĕp-ī-thē'lī-āl): of or pertaining to epithelium.
- epithelium** (-ŭm): tissue covering an outer surface or lining a tube or cavity, consisting of one or more layers of cells.

- eponychium** (čp'ō-nīk'ī-ūm): the narrow band of cuticle overlapping the nail body.
- erector** (ē-rēk'tōr): a muscle which produces erections or holds up a part. **e. pili** (pī'li): *see arrectores pilorum.*
- eruption** (ē-rūp'shūn): the act of breaking out or becoming visible.
- erysipelas** (čr'ī-sīp'ē-lās): a contagious disease due to the presence of streptococcus erysipelatis; characterized by inflammation of the skin and fever.
- erythema** (čr-īth-ē'mā): abnormal redness of the skin due to capillary congestion.
- erythrocyte** (čr-īth'rō-sīt): a red blood corpuscle.
- eschar** (čs'kār): a dry slough or scab produced by burning or the application of a corrosive substance.
- ethmoid** (čth'moid): bone of the nasal cavity.
- etiology** (č'tī-ōl'ō-jī): the study or theory of the causation of any disease.
- Eustachian** (ū-stū'kī-ān) **tube**: the channel between the tympanic cavity of the ear and the pharynx.
- excitability** (čk-sīt'ā-bīl'ī-tī): the property of responding to the action of stimulants.
- excoriation** (čks-kō-rī-ā'shūn): loss of substance, such as that produced on the skin by scratching.
- excrete** (čks-krēt'): to throw off or discharge waste material from the blood or tissues.
- excretion** (-shūn): the act or function of excreting; elimination of waste products from the body; the material excreted.
- exfoliate** (čks-fō'li-āt): to fall off in scales or layers.
- extend** (čks-tēnd'): to stretch or draw out.
- extensibility** (čks-tēn'sī-bīl'ī-tī): ability to stretch or extend.
- extensor** (čks-tēn'sōr): any muscle which performs extension.
- external** (čks-tūr'nāl): near the outside of the body.
- extremity** (čks-trēm'ī-tī): the end part of a limb.
- exudate** (čks'ū-dāt): a substance thrown out through the pores or through incisions.
- facial** (fā'shāl): of or pertaining to the face. **f. artery**: the artery which supplies the lower jaw, lip, orbit, nose, and lachrymal sac. **f. nerve**: the seventh cranial nerve.
- Fahrenheit** (fā'rēn-hīt): pertaining to the Fahrenheit thermometer or scale. (Water freezes at 32° F. and boils at 212° F.)
- faradic** (fā-rād'ik) **current**: a magnetically induced current of electricity.
- faradism** (-īz'm): the stimulation of nerve and muscle tissue by means of induced currents of low frequency.
- fascia** (fāsh'ī-ā): a sheet or layer of connective tissue which invests (incloses) and connects the muscles.

- favus** (fā'vūs): a contagious disease produced by a vegetable parasite.
- fibrin** (fī'brīn): a substance which aids in the coagulation of the blood and forms an essential portion of the clot.
- fibrocartilage** (fī''brō-kār'tī-lāj): tough elastic cartilage the matrix of which contains white fibrous tissue.
- filament** (fīl'ā-měnt): a threadlike process or appendage; a separate fiber.
- fission** (fīsh'ūn): a splitting or breaking up into parts.
- fissure** (fīsh'ūr): a narrow cleft or groove.
- flagella** (flāj-ēl'ah): slender, whiplike processes. **f. spore**: a spore provided with one or more flagella.
- flex** (flēks): to bend.
- flexor** (-ōr): a muscle that bends a joint; a muscle of the hand.
- follicle** (fōl'ī-k'l): a small cavity or a deep, narrow depression, such as a hair follicle.
- folliculitis** (fōl-īk''ū-lī'tīs): inflammation of a follicle or follicles.
- foramen** (fō-rā'mēn): an opening or perforation; a hole in a bone.
- formaldehyde** (fōr-māl'de-hīd): a disinfectant gas. The aqueous solution is used as a surgical and general antiseptic.
- formalin** (fōr'mā-līn): an aqueous solution of formaldehyde.
- formula** (fōr'mū-lā): an established rule; a special method of preparing a product.
- formulary** (fōr'mū-lā'rī): a collection of formulas and recipes.
- fossa** (fōs'ā): a cavity, depression, or hollow.
- fragilitas** (frā-jīl'ī-tās): brittleness. **f. crīn'ium**: a brittle condition of the hair.
- freckle** (frēk'l): a small brown or yellow spot on the skin.
- frequency** (frē'kwēn-sī): the number of complete cycles of current produced per second by an alternating-current generator.
- friction** (frīk'shūn): the act of rubbing.
- frontal** (frūn'tāl): pertaining to the forehead. **f. bone**: the bone of the forehead.
- frontalis** (frūn-tāl'īs): anterior portion of the occipito frontalis.
- fulguration** (fūl'gū-rā'shūn): act of flashing or lightening. Used in high frequency to remove skin blemishes and growths.
- fumigate** (fū'mī-gāt): to apply disinfecting fumes.
- function** (fūnk'shūn): the special activity of any part or organ.
- fundus** (fūn'dūs): the part of the internal surface of an organ opposite the opening.
- fungus** (fūn'gūs): a vegetable organism; a spongy growth of diseased tissue on the body.
- furuncle** (fūrūn-k'l): a boil.
- galvanic** (gāl-vān'īk) **current**: an uninterrupted electric current, the action of which is chemical.

- galvanism** (gǎl'vá-nǐz'm): the use of the galvanic current for remedial purposes.
- ganglion** (gǎn'glǐ-ōn): a mass of nerve tissue containing nerve cells.
- gas** (gǎs): a form of matter which takes the shape of any receptacle in which it is placed and distributes itself uniformly throughout the space.
- germ** (jǔrm): a microorganism; a microbe; a bacillus.
- germicide** (jǔr'mǐ-sǐd): an agent that kills germs.
- germinative** (jǔr'mǐ-nǎ-tǐv): having the power to grow or develop.
- glabrous** (glǎ'brūs): having a surface without hairs or projections.
- gland** (glǎnd): an organ for secreting a substance to be used in or eliminated from the body.
- glossal** (glōs'ǎl): pertaining to the tongue.
- glossopharyngeal** (glōs'ō-fǎ-rǐn'jē-ǎl): the ninth cranial nerve.
- glycerine** (glǐs'êr-ǐn): a syrupy liquid soluble in water and in alcohol; used as an ointment and as a solvent in making cosmetic preparations.
- granular** (grǎn'ū-lār): having a structure or texture consisting of grains or granules.
- granulosum** (grǎn'ū-lō'sūm): the granular layer of the epidermis. (*See stratum.*)
- great auricular**: *see auricular.*
- great occipital**: *see occipital.*
- halitosis** (hǎ-lī-tō'sis): offensive or bad breath.
- hamate** (hǎ'māt): a bone of the wrist; the unciform bone.
- Haversian** (hǎ-vŭr'shŭn) **canals**: the small canals through which the blood vessels ramify (divide) in bone.
- heart** (hǎrt): the hollow muscular organ which maintains the circulation of the blood.
- helical** (hēl'ī-kǎl): spiral.
- helix** (hē'līks): the margin of the pinna of the ear.
- hemal** (hē'mál): of or pertaining to the blood.
- hemoglobin** (hē'mō-glō'bĭn): the coloring matter of the red blood corpuscles.
- hemorrhage** (hēm'ō-rāj): any discharge of blood from the blood vessels.
- heredity** (hē-rēd'ī-tĭ): the transmission of qualities or disease from parents to offspring.
- herpes simplex** (hŭr'pēz sĭm'plēx): a skin disease marked by one or more vesicles on the lips.
- hidrosis** (hĭ-drō'sis): excretion of sweat.
- high-frequency** (hĭ frē'kwēn-sĭ) **current**: an electric current of high voltage and low amperage; it may be direct or alternating.

- hirci** (hîr'kî): hair of the axillae.
- hirsute** (hîr'sût): rough with hair; shaggy; set with bristles.
- hives** (hîvz): an eruptive skin disease; urticaria.
- holocrine** (hōl'ō-krîn): wholly secretory.
- homologous** (hō-mōl'ō-gūs): similar in structure to normal tissue.
- hormone** (hōr'mōn): a chemical substance produced in an organ which, when carried to an associated organ by the blood, excites the organ to activity.
- horn-fat**: a wax-like substance produced in the skin in the keratinization of epithelial cells.
- humerus** (hū'mēr-ūs): the bone of the upper arm.
- hydrate** (hî'drāt): any compound of a radical with water.
- hydro-** (hî'drō): a prefix signifying a relationship to water.
- hydrogen** (-jĕn): a gaseous element, odorless, tasteless, and colorless, found in water and in all organic compounds.
- hydrogen peroxide** (pĕr-ōk'sîd; -sîd): a cleansing and bleaching liquid; a disinfectant.
- hydropic** (hî'drō-skōp'îk) **quality**: the ability to absorb moisture.
- hydrotherapy** (-thĕr'ā-pî): the use of water in the treatment of disease.
- hygiene** (hî'jî-ĕn): the science of health and its preservation.
personal h.: the health of the individual, the care of the body, and so forth. **public h.:** the preservation of community health; observance of the rules of City and State Departments of Public Health.
- hyoid** (hî'oid): bone situated at the base of the tongue.
- hyper** (hî'pĕr): a prefix signifying *over-*.
- hyperemia** (hî'pĕr-ĕmĭ-ā): an excess of blood to any part of the body.
- hyperhidrosis** (hî'pĕr-ĭ-drō'sis): excessive sweating.
- hypersecretion** (hî'pĕr sĕ-krĕ'shŭn): excessive secretion.
- hypertrichosis** (hî'pĕr-trĭ-kō'sis): excessive growth of hair.
- hypertrophy** (hĭ-pŭr'trō-fĭ): the enlargement or overgrowth of an organ or part.
- hypo-** (hĭ'pō): a prefix signifying a *less quantity*.
- hypoglossal** (hĭ'pō-glōs'āl) **nerve**: the twelfth cranial nerve.
- hyponychium** (hĭ'pō-nĭk'ĕ-ŭm): the layer of the epidermis upon which the nail body rests.
- hyposecretion** (hĭ'pō-sĕ-krĕ'shŭn): diminished secretion.
- ichthyosis** (ĭk'thĕ-ō'sis): a disease characterized by a dryness, roughness, and scalliness of the skin, due to the hypertrophy of the horny layers of the epidermis; "fish skin."
- idiosyncrasy** (ĭd'ĭ-ō-sĭn'krā-sĭ): characteristic susceptibility.

- imbrication** (ĩm''brĩ-kā'shũn): an overlapping of the edges.
- immunity** (ĩ-mũ'nĩ-tĩ): state of being immune; state of resisting the development of any particular disease.
- impermeable** (ĩm-pũr'mē-ā-b'l): not permitting passage, as of a fluid through a substance.
- impetigo** (ĩm''pē-tĩ'gō): an inflammatory disease characterized by isolated pustules.
- index** (ĩn'dēks): the forefinger.
- induration** (ĩn-dũ-rā'shũn): the quality of being hard; an abnormal hard spot or place.
- infection** (ĩn-fēk'shũn): the state produced by the invasion and growth in the tissues of disease-producing organisms.
- infectious** (ĩn-fēk'shũs): communicable; liable to be communicated by infection.
- inferior** (ĩn-fē'rĩ-ēr): of lower degree; situated directly below.
- i. labial** (lā'bĩ-āl): artery of the lower lip. **i. maxillary** (māk'sĩ-lā-rĩ): artery of the deeper portions of the face.
- i. turbinate** (tũr'bĩ-nāt''): bone of the nasal cavity.
- infiltrate** (ĩn-fĩl'trāt): to cause to pass into or through interstices, as a liquid or gas in the tissues; to cause to penetrate gradually.
- inflammation** (ĩn-flĩ-mā'shũn): a reaction of the tissues to irritation, characterized by external redness and swelling.
- infra-** (ĩn'frā): below; beneath.
- infraorbital** (-ōr'bĩ-tũl): below the orbit; the nerve of the cheeks, nose, and lip.
- infrared** (-rēd'): pertaining to that part of the spectrum lying outside the visible spectrum and below the red rays; rays produced by special apparatus and used for scalp treatments, facials, and so forth.
- infratrochlear** (-trōk'lē-ār) **nerve**: a branch of the nasal nerve.
- ingredient** (ĩn-grē'dĩ-ēnt): a component part of any combination or mixture.
- inherent** (ĩn-hēr'ēnt): innate; firmly or permanently contained or joined.
- inhibition** (ĩn''hĩ-bĩsh'ũn): a restraining of the function of an organ.
- innominate** (ĩn-nōm'ĩ-nāt) **veins**: veins of the neck.
- inoculation** (ĩn-ōk''ũ-lā'shũn): the insertion of a virus into the system through the skin; to communicate disease by infection.
- inorganic** (ĩn''ōr-gān'ĩk): having no organs; composed of matter other than animal or vegetable.
- insanitary** (ĩn-sān'ĩ-tē-rĩ): not sanitary; injurious to health.
- insertion** (ĩn-sũr'shũn): the place of attachment of an organ or of a part.
- insoluble** (ĩn-sōl'ũ-b'l): not soluble; incapable or very difficult of being dissolved (in a liquid).

- insulator** (in'sū-lā''těr): a nonconducting substance used in preventing the escape of electricity.
- integument** (in-těg'ū-měnt): a covering or coat; the skin.
- intercellular** (in''těr-sěl'ū-lār): situated between the cells of a structure.
- internal** (in-tûr'năl): interior; inclosed. **i. maxillary artery**: the larger of the two terminal branches of the external carotid artery. **i. maxillary glands**: the glands which receive lymph from parts of the face.
- interosseous** (in-tûr-ôs'ē-ūs): situated between bones.
- interstice** (in-tûr'stīs): a small gap or space in a tissue or structure.
- involuntary** (in-völ'ün-tā-rĩ) **muscle**: a muscle whose contraction is not under the control of the will.
- ion** (i'ŏn): an electrified particle formed when a neutral atom or group of atoms loses or gains one or more electrons.
- ionization** (i'ŏn-ĩ-zā'shŭn): the dissociation of a substance in solution into its constituent ions.
- jugular** (jōō'gū-lār): pertaining to the neck. **j. veins**, internal and external: the veins which return the blood from the head and face to the heart.
- kaolin** (kā'ō-lĩn): a fine clay used in cosmetics and for facial packs.
- karaya** (kā-rā'ā): a gum used in the manufacture of cosmetics.
- keloid** (kē'loid): a growth or tumor of the skin.
- keratin** (kěr'ā-tĩn): an insoluble substance which forms the base of the epidermis, the hair, and all other horny tissues.
- keratosis** (kēr-ā-tō'sīs): any horny growth, such as a wart or callus; any disease characterized by horny growths.
- kilowatt** (kĩl'ō-wăt): one thousand watts of electricity.
- knead** (nēd): to work or press with the hands, as in giving massage.
- kohl** (kōl): a preparation for coloring the eyelids.
- labial** (lā'bĩ-ăl): of or pertaining to the lips.
- lachrymal** (lăk'rĩ-măl): pertaining to tears. **l. bone**: the bone of the face.
- lanolin** (lăn'ō-lĩn): wool fat or grease, used as a base for ointments and in cold creams.
- lanugo** (lā-nũ'gō): the soft down which covers the human fetus; the downy hair found on nearly all parts of the body.
- lateral** (lăt'ěr-ăl): pertaining to the side; directed toward or coming from the side.
- lateralis nasi** (lăt'ěr-ăl'ĩs nā'sĩ): artery of the nostrils.
- lecithin** (lēs'ĩ-thĩn): a substance found in yolk of egg; used making cosmetics.
- lentigo** (lěn-tĩ'gō): a freckle; a small pigmentation of the skin.

- leptothrix** (lěp'ō-thrĭks): a bacterial infection in which the hair becomes dry and scaly.
- lesion** (lě'zhŭn): any local wound or degeneration.
- lesser** (lěs'ēr): smaller; inferior. 1. **occipital nerve**: the nerve affecting the skin behind the ear.
- leucocyte** (lŭ'kō-sīt): any colorless cell mass with ameboid qualities, such as white blood corpuscles.
- leucoderma** (lŭ'kō-dŭr'má): white skin; abnormal whiteness in patches.
- leuconychia** (lŭ-kŏn'ĭk-ĭ-à): a whitish discoloration of the nails.
- levator** (lē-vā'tôr): a muscle that raises some part. 1. **anguli oris** (ăn'gŭ-lĭ ō'rĭs): the muscle which elevates the corner of the mouth. 1. **labii** (lă'bĭ-ĭ): **inferioris** and **superioris**: the muscles which raise the lower and upper lip, respectively. 1. **labii superioris alaeque nasi** (ă'lē-kwē nă'sĭ): the muscle which raises the upper lip and dilates the nostril. 1. **palpebrae** (păl'pē-brē): the muscle of the upper eyelid. 1. **scapula** (skăp'ŭ-lâ): the muscle which raises the upper angle of the scapula.
- ligament** (lĭg'ă-měnt): any tough band of tissue connecting bones or supporting organs.
- lingual** (lĭn'gwăł): of or pertaining to the tongue.
- liquid** (lĭk'wĭd): a substance that flows freely; not solid.
- litmus** (lĭt'mŭs): a blue pigment used as a test for acidity and alkalinity; it is turned red by acids and is made blue again by alkalis.
- lubricant** (lŭ'brĭ-kănt): that which lubricates, such as oil and grease.
- lubricate** (-kăt): to make smooth; to lessen friction.
- lucidum** (lŭ'sĭd-ŭm): the stratum lucidum of the epidermis. (See **stratum**.)
- lunate** (lŭ'năt): a bone of the wrist.
- lunula** (lŭ'nŭ-lah): the whitish crescent at the base of the nail.
- lymph** (lĭmf): a transparent liquid of alkaline reaction which fills the lymphatic vessels.
- lymphatic** (lĭm-făt'ĭk): of or pertaining to lymph; a vessel conveying lymph. 1. **ducts**: the right and left thoracic ducts which receive lymph from the body above the diaphragm.
- lymphocyte** (lĭm'fō-sīt): white blood corpuscles which originate in the lymph glands and nodes.
- Lysol** (lĭ'sŏl): a compound solution of creosol. (The name is a trademark.)

macule (măk'ŭl) or **macula**: a discolored spot on the skin.

madarosis (măd-ă-rŏ'sis): loss of the eyelashes or eyebrows.

- magnum** (măg'nŭm): the largest bone of the wrist.
- malar** (mă'lâr): pertaining to the cheek. **m. bone**: the bone of the upper and outer part of the face. **m. nerve**: the nerve which affects the corrugator and orbicularis oculi muscles and the eyelids.
- malformation** (măl'fôr-mă'shŭn): irregularity; an abnormal deviation from the usual structure.
- malignant** (mă-lĭg'nănt): virulent; tending to produce death.
- malnutrition** (măl'nŭ-trĭsh'ŭn): imperfect assimilation and nutrition.
- Malpighian** (măl-pĭg'i-ăn): stratum Malpighian of the epidermis. (See stratum.)
- mammal** (măm'ăl): one of the mammalia, the highest class of vertebrates, including all that nourish their young with milk.
- mandible** (măn'dĭ-b'l): the jaw bone.
- mandibular** (măn-dĭb'ŭ-lâr) **nerve**: the nerve affecting the lower jaw, teeth, tongue, cheeks, and ears.
- manicure** (măn'i-kŭr): to care for the hands and nails.
- manipulation** (mă-nĭp'ŭ-lă'shun): skillful treatment by the hands.
- mantle** (măn't'l): the fold of skin which incloses the nail root.
- marrow** (mă'r'ô): the soft material that fills most of the cavities of the bones.
- massage** (mă-săzh'): the systematic stroking, friction, and kneading of the soft parts of the body.
- masseter** (mă-sĕ'tĕr): the muscle of the lower jaw.
- masseteric** (mă'sĕ-tĕr'ĭk): the nerve affecting the masseter muscle.
- mastoid** (mă's'toid) **process**: a process of the temporal bone behind the ear.
- matrix** (mă'trĭks): the formative cells from which a structure grows.
- matter** (mă'tĕr): anything that occupies space.
- maxilla** (măk-sĭl'ă): the jaw; the jaw bone.
- maxillary** (măk'sĭ-lă'rĭ): of or pertaining to a maxilla. **inferior m.**: bone of the lower jaw. **superior m.**: bone of the upper jaw.
- meatus** (mĕ-ă'tŭs): a natural passage or canal.
- medial** (mĕ'dĭ-ăl): situated in the middle.
- median** (mĕ'dĭ-ăn) **nerve**: the nerve which affects the arm and hand. **m. vein**: the vein which supplies the forearm.
- medius** (mĕ'dĭ-ŭs): the middle finger.
- medulla** (mĕ-dŭl'ă): the inner tissue of a part, as of a hair; the marrow of bones; any substance resembling marrow. **m. oblongata** (ôb'lôn-gă'tă): the lowest part of the brain.
- medullary** (mĕd'ŭ-lă-rĭ) **canal**: the marrow cavity of bone. **m. sheath**: the myelin covering of a nerve fiber.
- medullated fiber**: a fiber covered by a medullary substance.

- melanin** (měl'á-nín): the dark brown or black coloring matter of the human body.
- melanoblast** (měl'á-nō-blăst): an epithelial cell which generates pigment.
- melanoderma** (-dûr'mâ): an abnormal deposit of melanin in the skin.
- melanophore** (-fôr): a pigment-carrying cell.
- membrane** (mēm'brân): any thin sheet or layer covering animal or vegetable tissue.
- mentalis** (mĕn-tăl'is) **muscle**: *see levator labii inferioris*.
- merocrine** (měr'ōk-rĭn): partly secretory.
- metabolism** (mě-tăb'ō-lĭz'm): tissue changes and formation by which energy is made available for body uses.
- metacarpal** (mēt'â-kăr'pāl): bone of the wrist.
- metacarpus** (-pūs): the part of the hand between the carpus and the phalanges.
- meter** (mĕ'tĕr): an instrument for indicating the flow of electric current.
- microbe** (mĭ'krōb): any microorganism.
- micrococcus** (mĭ'krō-kōk'ūs): a minute bacterial coccus or cell form.
- microorganism** (-ôr'găn-ĭz'm): any organism of microscopic size.
- microscopic** (-skōp'ĭk): visible only with a microscope.
- miliaria** (mĭl'ĭ-ă-rĭ-ă): an inflammation of the sweat glands; prickly heat.
- milium** (mĭl'ĭ-ŭm): a small, whitish nodule in the skin; a retention cyst of a sebaceous gland.
- milliampere** (mĭl-ĕ-ăm'pĕr): 1/1000 of an ampere.
- millimeter** (mĭl'ĭ-mĕ'tĕr): 1/1000 of a meter.
- minimus** (mĭn'ĭ-mŭs): the little finger.
- mitosis** (mĭ-tō'sĭs): indirect cell division by which the cells of animals and plants multiply.
- mixture** (mĭks'tŭr): the suspension of an insoluble substance in a fluid by means of gum arabic, or the like.
- modality** (mō-dăl'ĭ-tĭ): a physiotherapeutic procedure or method.
- mole** (mōl): a spot or protuberance on the skin; a nevus.
- molecule** (mōl'ĕ-kŭl): the smallest particle of any substance which can retain identity in character with that substance.
- monilethrix** (mō-nĭl'ĭ-thrĭks): a disease of the hair.
- mononuclear** (mōn'ō-nŭ'klĕ-ăr): having but one nucleus.
- morbid** (môr'bĭd): a diseased or abnormal condition.
- mordant** (môr'dănt): a substance which combines with a dye, fixing the color.
- motor** (mō'tĕr): a muscle or nerve that effects movements. **m. oculi** (ōk'ŭ-lĭ): the third cranial nerve.

mucosum (mū-kō'sūm): stratum mucosum of the epidermis. (See stratum.)

mucous membrane (mū'kūs): the lining membrane of the passages and cavities of the body which communicate directly or indirectly with the outside of the body.

muscle (mūs'l): a mass of tissue whose special function is to produce motion.

muscle tone (tōn): the normal degree of tension of a healthy muscle.

myelin (mī'ě-lín): the white substance forming the sheath of medullary nerve fibers.

myocardium (mī-ō-kār'dī-ŭm): the muscular substance of the heart.

myology (mī-ōl'ō-jī): the branch of anatomy that treats of the muscles.

nape (nāp): the back part of the neck.

naris (nā'rīs): the nostril.

nasal (nā'zāl): pertaining to the nose.

nasalis (nā-sā'lis): muscle of the nose.

navicular (nā-vīk'ū-lār): the scaphoid bone of the wrist.

nerve (nūrv): a cell process with its covering or sheath.

neurology (nū-rōl'ō-jī): the sum of knowledge regarding the nervous system.

neuron (nū'rōn): a nerve cell together with its processes.

neutralize (nū'trāl-iz): to destroy the effect of.

nevus (nē'vūs): a pigmented place on the skin; a mole.

nitrogen (nī'trō-jēn): a colorless, gaseous element constituting about four-fifths of the atmosphere.

nodosa (nō-dōs'á): having nodes.

nodule (nōd'ul): a small node or lump.

nonconductor (nōn'kōn-dŭk'tēr): a substance that does not transmit heat or electricity; an insulator.

nonmedullated (nōn-mēd'ū-lāt'ēd): without medullary sheath.

nonpathogenic (nōn-pāth'ō-jēn'ik): not causing disease or morbid symptoms.

nonstriated (nōn-strīāt-ēd): not striped.

nonvascular (nōn-vās'kū-lār): not supplied with blood vessels.

- obliquus** (öb-lī'kwūs), **superior and inferior**: the muscles that rotate the eyeball.
- occipital** (ök-sīp'ī-tāl): pertaining to the occipital bone. **o. artery**: a branch of the external carotid artery supplying the back of the neck and head. **o. bone**: the bone at the back and base of the cranium. **o. glands**: those which receive lymph from the occipital region of the scalp. **great o. nerve**: that which affects the scalp.
- occipito frontalis** (ök-sīp'ī-tō frōn-tā'lis) **muscle**: the muscle of the skull; the scalp muscle.
- ocular** (ök'ū-lār): of or pertaining to the eye.
- oculomotor** (ök'ū-lō-mō'tēr) **nerve**: the third cranial nerve.
- ohm** (ōm): the practical unit of electrical resistance; the amount of resistance overcome by one volt with a current of one ampere.
- oleic** (ō'lē-īk): pertaining to, or derived from oil.
- olfactory** (öl-fāk'tō-rī): connected with the sense of smell.
o. nerve: the first cranial nerve.
- onychatrophia** (ön''ī-kā-trō'fī-à): atrophy of a nail or of the nails.
- onychauxis** (ön''ī-kôk'sīs): overgrowth of the nail.
- onychchia** (ō-nīk'ī-à): inflammation of the nail.
- onycholysis** (ön''ī-kôl'ī-sīs): loosening of the nail.
- onychomycosis** (ön''ī-kō-mī-kô'sīs): disease of the nail due to the ringworm or favus fungus.
- onychophagy** (ön''ī-kôf'ā-jī): biting the nails.
- onychoptosis** (ön''ī-kôp-tô'sīs): falling off of the nail.
- onychorrhaxis** (ön''ī-kô-rêk'sīs): splitting of the nail.
- onychosis** (ön''ī-kô'sīs): disease of a nail.
- optic** (öp'tīk): of or pertaining to the eye. **o. nerve**: the second cranial nerve.
- orbicular** (ôr-bīk'ū-lār): spherical; circular.
- orbicularis oculi** (ôr-bīk'ū-lā'rīs ök'ū-lī): the muscle which closes the eye and wrinkles the forehead.
- orbicularis oris** (ôr'rīs): the muscle which closes the mouth.
- orbicularis palpebrarum** (pāl'pē-brā'rūm): the muscle of the eyelid.
- orbit** (ôr'bīt): the bony socket which contains the eye.
- orbital** (-tāl): pertaining to the orbit. **o. artery**: the artery which supplies the eye cavity.
- organ** (ôr'gān): a part of the body which performs a special function.
- organic** (ôr-gān'īk): pertaining to an organ or to the organs.
- organism** (ôr'gān-īzm): any individual animal or plant.
- orifice** (ôr'ī-fīs): an opening, such as the orifice of an artery or a vein.

- origin** (ôr'ĩ-jĩn): the more fixed attachment or end of a muscle.
- os magnum** (ôs mǎg'nũm): bone of the carpus.
- osmosis** (ôs-mō'sis): the diffusion which takes place between liquids or gases separated by a permeable membrane.
- osteology** (ôs'tē-ôl'ō-jĩ): the study of the bones.
- Oudin** (ou'dĩn) **current**: high-frequency current of high voltage and low amperage.
- oxidation** (ôk'sĩ-dǎ'shũn): the act of oxidizing.
- oxide** (ôk'sĩd): a compound of oxygen with an element or radical.
- oxidize** (ôk'sĩ-dĩz): to combine or cause to combine with oxygen.
- oxygen** (ôk'sĩ-jẽn): a colorless, tasteless, odorless, chemically active gaseous element occurring in the free state in the atmosphere.
- oxygenation** (-ǎ'shũn): impregnating with oxygen, such as takes place in the blood in the lungs.
- palate** (pǎl'ǎt): the roof of the mouth. **p. bone**: that which forms the posterior portion of the hard palate and side wall of the nose.
- palmar** (pǎl'mǎr): pertaining to the palm of the hand.
- palmitic** (pǎl-mĩt'ĩk): pertaining to the fatty acid occurring in palm oil.
- palpebral** (pǎl'pē-brǎl): pertaining to the eyelids. **p. twig**: the nerve of the lower eyelid; the lachrymal nerve.
- papilla** (pǎ-pĩl'ǎ): a small pimple-shaped projection.
- papillary** (pǎp'ĩ-lǎ'rĩ): pertaining to, or resembling a papilla. **p. layer**: the outer layer of the corium.
- papule** (pǎp'ũl): a small, circumscribed elevation; a pimple.
- papulose** (pǎp'ũ-lōs): covered with pimples.
- paraphenylenediamine** (pǎr'ǎ-fẽn'ĩ-lẽn-dĩ'ǎm-ĩn): an agent used in hair dyes, derived from aniline.
- parasite** (pǎr'ǎ-sĩt): a plant or animal which lives within or upon another living organism.
- paratoluenediamine** (pǎr'ǎ-tō'lũ-ĩn(-ēn)-dĩ'ǎm'ĩn): an agent used in hair dyes, derived from aniline.
- parietal** (pǎ-rĩ'ē-tǎl): pertaining to the walls of a part or a cavity. **p. bone**: a bone of the cranium.
- paronychia** (pǎr'ō-nĩk'ĩ-ǎ): an abscess of a nail; a felon.
- parotid** (pǎ-rōt'ĩd) **gland**: a gland situated near the ear.
- patheticus** (pǎ-thět'ĩk-ũs): the fourth cranial nerve.
- pathogenic** (pǎth'ō-jẽn'ĩk): causing disease or morbid symptoms.
- pathological** (pǎth'ō-lōj'ĩ-kǎl): morbid; due to disease.
- pathology** (pǎ-thōl'ō-jĩ): the science treating of diseases, their nature, causes, progress, and so forth.
- pediculosis** (pē-dĩk'ũ-lō'sis): lice. **p. capitis** (cǎp'ĩ-tis): lousiness of the hair of the head.

- pelage** (pě'l'áj): the covering or coat of a mammal, as of wool, fur, or hair.
- percussion** (pěr-küş'ün): the act of striking a part with short, sharp blows; one of the movements used in massage.
- pericardium** (pěr'ĩ-kār'dĩ-üm): the sac of membrane which encloses the heart.
- pericranium** (pěr'ĩ-krā'ni-üm): the periosteum of the cranium.
- periosteum** (pěr'ĩ-ös'tē-üm): the tough membrane surrounding a bone.
- periphery** (pě-rĩf'ēr-ĩ): the external boundary; the outward surface.
- perspiration** (pûr'spĩ-rā'shũn): the fluid secreted by the sudoriferous glands; sweat.
- petrissage** (pá'trēs-sahzh'): a kneading manipulation used in massage.
- petrolatum** (pět'rō-lā'tũm): a yellowish, ointment-like substance obtained from petroleum.
- phagocyte** (fǎg'ō-sīt): any cell that destroys harmful cells by enveloping and destroying them.
- phalange** (fǎl'ǎnj): any bone of a finger or toe.
- phalanx** (fǎl'ǎnks): a phalange.
- pharynx** (fār'ĩnks): the upper portion of the digestive tube behind the nose and mouth.
- phenol** (fě'nōl): carbolic acid; used as a disinfectant.
- phenomenon** (fē-nōm'ē-nōn): any remarkable sign; an objective symptom.
- phoresis** (fōr-ēs'sis): the act of forcing solutions into the tissues by use of the galvanic current.
- physical** (fĩz'ĩ-kǎl): of or pertaining to nature or to the body.
- physiology** (fĩz'ĩ-ōl'ō-jĩ): the science that treats of the functions of living organisms.
- physiotherapy** (fĩz'ĩ-ō-thēr'á-pĩ): physical therapy; the use of heat, light, water, air, and exercise in the treatment of disease.
- pigment** (pĩg'měnt): a coloring matter; any dye or paint.
- pilary** (pĩ'lá-rĩ): of or pertaining to hair.
- pinna** (pĩn'á): the auricle of the ear.
- pisiform** (pĩ'sĩ-fōrm): a bone of the carpus.
- pituitary** (pĩ-tũ'ĩ-tā-rĩ): pertaining to the pituitary gland.
- pityriasis capitis** (pĩt'ĩ-rĩ'á-sĩs cǎp'ĩ-tĩs): a skin disease characterized by patches of scales.
- plasma** (plǎz'mǎ): the fluid part of blood or lymph.
- platelets** (plāt'lěts): blood plates; thin disks forming one of the constituents of the blood.
- platysma myoides** (plá-tĩz'mǎ mĩ-oi'děz): muscle of the neck.

- pneumogastric** (nū''mō-gās'trīk): pertaining to the lungs and stomach. **p. nerve**: the tenth cranial nerve; a vagus nerve.
- polarity** (pō-lār'ī-tī): positive or negative state with reference to the two poles or to polarization.
- pollex** (pōl'ēks): the thumb.
- polymorphonuclear** (pōl''ī-môr''fō-nū'klē-âr): a common type of leucocyte in human blood.
- pore** (pôr): any minute opening upon a free surface.
- positive** (pōz'ī-tiv): that pole or battery which yields positive electricity; healthy reaction of the skin to a dye test.
- posterior** (pōs-tē'rī-ēr): situated behind or toward the rear.
- posterior auricular nerve**: see auricular.
- postiche** (pōs-tēsh'): an artificial hair piece.
- potential** (pō-tēn'shāl): possible but not actual; electrical tension.
- predisposition** (prē''dis-pō-zīsh'ūn): a special tendency toward a disease.
- premature** (prē'mā-tūr): existing before the proper time.
- primary** (prī'mā-rī): first in order. **p. hair**: the lanugo of fetal life.
- procerus** (prō-sē'rūs): the pyramidalis nasi muscle.
- process** (prōs'ēs): any projecting point, such as the process of a bone.
- pronate** (prō'nāt): inclined, as turning the palm of the hand downward.
- pronator** (-tôr): muscle of the hand.
- prophylaxis** (prō''fī-lāk'sīs): act of guarding against, preventive treatment to guard against, disease.
- protoplasm** (prō'tō-plāz'm): the form of matter which manifests life, which makes up the vital material of all plant and animal cells.
- proximal** (prōk'sī-māl): next to or nearest to, or on the side toward, the body; opposed to *distal*.
- pruritus** (prōō-rī'tūs): intense itching; a symptom of various skin diseases.
- psoriasis** (sō-rī'ā-sīs): a skin disease characterized by the formation of scaly red patches. **p. punctata** (pŭnk'tā-tā): a skin disease in which the red pinhead papules are often covered with scales.
- pterygoid** (tēr'ī-goid) **bone**: the pterygoid plate of the sphenoid bone of the skull. **p. muscle**: of the lower jaw.
- pubes** (pŭ'bēz): the hair of the genital regions.
- pulmonary** (pŭl'mō-nā'rī): pertaining to the lungs. **p. artery**: the artery which conveys venous blood from the heart to the lungs. **p. circulation**: the circulation of the blood from the heart to the lungs and back to the heart.

- pulse (pŭls): the expansion and contraction of an artery which may be felt at the wrist.
- pumice (pŭm'is): spongy, volcanic lava used, in powdered form, for smoothing and polishing.
- pus (pŭs): matter produced by the process of suppuration.
- pustule (pŭs'tŭl): a small elevation of the cuticle containing pus.
- putrefaction (pŭ'trē-fāk'shŭn): decomposition of animal and vegetable matter by the activity of bacteria.
- pyramidalis nasi (pŭ-rām'ī-dā'lis nā'si) muscle: the muscle of the nose.
- pyrogallol (pŭ'rō-gāl'ol): a poisonous substance used in making dyes.
- quadratus labii (kwōd-rā'tŭs lā'bŭ-ī) inferioris: the muscle of the lower lip. q. 1. superioris: the muscle of the upper lip.
- quarantine (kwār'ān-tēn): to detain or isolate on account of contagious disease.
- quince (kwŭns) seed: used in the making of a mucilage for hand lotions.
- radial (rā'dī-āl): in the region of the radius bone of the forearm.
 r. artery: that which supplies the lower arm and hand.
 r. nerve: that which affects the arm and hand. r. vein: the vein which supplies the forearm on the thumb side.
- radius (rā'dī-ŭs): the bone of the forearm.
- ramus (rā'mŭs): a branch, as of an artery, nerve, or vein.
- rash (rāsh): a fine temporary eruption on the skin.
- rectus (rĕk'tŭs): the muscle of the eyeball.
- regenerate (rē-jĕn'ēr-āt): to renew or repair injured tissue.
- respiration (rĕs'pī-rā'shŭn): the act of breathing.
- rete (rĕ'tē): a net; a meshwork of nerve fibers or blood vessels.
- reticular (rē-tĭk'ŭ-lār): resembling a net. r. tissue: a network of tissue fibers.
- retrahens aurem (rĕ'trā-hĕnz ôr'ēm): the muscle of the ear.
- rheostat (rĕ'ō-stāt): a contrivance for regulating the current-strength of electricity.
- rhomboideus (rōm-boi'dē-ŭs) major and minor: the muscles of the scapula.
- risorius (rī-sō'rī-ŭs): the muscle of the mouth.
- saline (sā'līn): salty; consisting of salt or containing salt.
- salt (sôlt): the result of the action of an acid and a base.
- sanitary (săn'ī-tā'rī): pertaining to or securing health.
- sanitation (săn'ī-tā'shŭn): use of sanitary measures favorable to health.
- saponify (sā-pŏn'ī-fī): to convert into soap.

- saprophyte** (săp'rō-fit): any vegetable organism which lives on decaying or dead organic matter.
- scab** (skăb): an incrustation formed by the drying up of the discharge over a wound or sore.
- scale** (skāl): a flattened plate or husk forming part of the outer covering of a body, such as epithelial cells.
- scaphoid** (skăf'oid): the bone of the carpus.
- scapula** (skăp'ū-lă): the shoulder blade.
- scar** (skâr): a mark in the skin made by a wound or ulcer.
- schema** (skē'mâ): plan; outline; diagram.
- scurf** (skûrf) **skin**: the cuticle.
- sebaceous** (sē-bă'shûs): pertaining to sebum. **s. gland**: the oil glands of the hair follicle.
- seborrhea** (sēb'ō-rē'à): an excessive discharge of sebum. **s. oleosa** (ō-lē-ō'sâ): in which the discharge is oily. **s. sicca** (sīk'à): characterized by dry scales or scabs.
- sebum** (sē'bûm): the fatty matter secreted by the sebaceous glands.
- secondary** (sēk'ûn-dă'rî): performing a function similar but inferior to a primary function. **s. hair**: the hair of childhood.
- secrete** (sē-krēt'): to separate and discharge as secretion.
- secretion** (-shûn): material discharged by cells, as the epithelial cells of the glands.
- secretory** (sē-krēt'ō-rî): secreting or affecting the secretion.
- semilunar** (sēm'ī-lū'nâr): the bone of the carpus.
- senile** (sē'nîl): of or pertaining to old age.
- sensory** (sēn'sō-rî): of or pertaining to sensation. **s. nerves**: nerve fibers which convey sensations to nerve centers.
- sepsis** (sēp'sîs): poisoning by the products of putrefactive microorganisms.
- septum** (sēp'tûm): a wall or partition separating two cavities or masses of tissue.
- serratus** (sč-ră'tûs) **anterior**: the muscle of the shoulder girdle.
- sesamoid** (sēs'à-moid): a small bone developed in a tendon which moves over a site of irritation.
- sinusoidal** (sī'nûs-oi'dăl) **currents**: alternating electric currents, so called because their wave follows a sine curve or part of a circle.
- skeletal** (skēl'ē-tăl): pertaining to the skeleton. **s. muscles**: muscles attached to parts of the skeleton.
- skeleton** (-tûn): the bony framework of the body.
- skull** (skûl): the bony case which incloses and protects the brain.
- solid** (sōl'îd): a substance with weight, volume, and shape; not fluid or gaseous.
- soluble** (sōl'ū-b'l): susceptible of being dissolved in a fluid.
- solute** (sō-lût'): a substance dissolved in a solution.

- solution** (sō-lū'shŭn): a liquid containing dissolved matter.
- solvent** (sōl'vent): a liquid used in dissolving.
- spermaceti** (spûr'mâ-sē'ti): fat from the head of the sperm whale; used in making cosmetics.
- sphenoid** (sfē'noid) **bone**: the wedge-shaped bone at the base of the skull which joins together the other bones of the cranium.
- spinal accessory** (spī'nāl āk-sēs'ō-rī): the eleventh cranial nerve.
- spirillum** (spī-ril'ŭm): a type of bacteria.
- spore** (spōr): the reproductive element of one of the lower organisms.
- squamous** (skwā'mŭs): scaly or platelike.
- staphylococcus** (stáf'i-lō-kōk'ŭs): the bacteria commonly found in boils, abscesses, carbuncles, and other suppurative processes.
- stearic** (stē-ār'ic): obtained from or like stearin (tallow).
- steatoma** (stē'à-tō'mâ): a cyst or wen due to the retention of secretion in a sebaceous gland.
- sterile** (stēr'il): not fertile; aseptic; free from microorganisms.
- sternocleidomastoid** (stŭr'nō-klī'dō-mās'toid): the muscle of the head and neck.
- sternum** (stŭr'nŭm): the breast bone.
- stimulate** (stĭm'ŭ-lāt): to arouse, excite, or irritate; to excite the activity of a nerve.
- stimulus** (-lŭs): an agent that produces functional activity in a tissue or organ.
- stratum** (strā'tŭm): a layer. **s. corneum** (cōr'nē-ŭm): the outer layer of the epidermis. **s. granulosum** (grăn'ŭ-lō'sŭm): the layer of the epidermis situated between the stratum Malpighian and the stratum lucidum. **s. lucidum** (lŭ'cī-dŭm): the layer situated between the stratum corneum and the stratum granulosum. **s. Malpighii** (māl-pĭg'ī-ī): the germinative layer, situated next to the corium; also called **s. mucosum**.
- streptococcus** (strĕp'tō-kōk'ŭs): bacteria occurring in pairs or chains, found in erysipelas, sore throat, and other diseases.
- striated** (strī'āt-ĕd): marked with stripes.
- styptic** (stĭp'tĭk): a preparation or astringent which stops bleeding.
- subclavian** (sŭb-clā'vī-ăn): under the clavicle. **s. artery**: the artery of the arm. **s. vein**: the vein of the arm.
- subcutaneous** (sŭb'kŭ-tā'nē-ŭs): under the skin.
- subcutis** (sŭb-kŭ'tis): the subcutaneous tissue.
- submaxillary** (sŭb-māk'sī-lā'rī): below the lower jaw. **s. gland**: that gland which receives lymph from the lower parts of the face.
- subparotid** (sŭb-pā-rōt'id) **gland**: the gland which receives lymph from the front of the scalp and the upper parts of the face.
- sudamina** (sŭ-dām'ī-nâ): whitish vesicles caused by the retention of sweat in a sudoriferous duct.

- sudoriferous** (sū'dōr-ī'ēr-ūs): of or pertaining to sweat.
s. gland: a gland of the skin.
- sunburn** (sūn'bûrn): dermatitis due to exposure to the sun.
- supercilia** (sū'pēr-sīl'ī-ā): the hair of the eyebrows.
- superficial** (sū'pēr-fīsh'āl): situated near the surface. **s. cervical nerve**: spinal nerve of the region of the neck. **s. musculature** (mūs'kū-lā-tūr): the outer muscles of the body.
- superfluous** (sū-pūr'floo-ūs): excessive; more than is wanted or natural. **s. hair**: hypertrichosis.
- superior** (sū-pē'rī-ēr): upper; more elevated in position. **s. coronary** (kōr'ō-nā-rī) **artery**: the artery of the upper lip; same as *superior labial*. **s. glands**: a group of facial glands receiving lymph from parts of the face. **s. maxillary nerve**: the nerve of the upper jaw. **s. orbital artery**: the artery of the forehead and orbit.
- supinate** (sū'pī-nāt): to turn the palm of the hand upward.
- supinator** (-tōr): the muscle of the hand.
- suppuration** (sūp'ū-rā'shūn): the formation of pus.
- supra-** (sū'prā): a prefix signifying *over* or *above*. **s. orbital nerve**: the nerve which affects the upper eyelid, forehead, and pericranium. **s. trochlear** (trōk'lē-ār) **nerve**: that which affects the forehead and upper eyelid.
- susceptible** (sū-sēp'tī-b'l): readily acted upon; capable of impression.
- suture** (sū'tūr): the line of junction of adjacent bones.
- sycosis** (sī-kō'sīs): an inflammation of the hair follicle.
- symbol** (sīm'bōl): a mark or character representing an atom of an element or a molecule of a radical.
- synovia** (sī-nō'vī-ā): the fluid of a joint cavity.
- synthesis** (sīn'thē-sīs): the artificial building up of a compound by the union of its elements.
- synthetic** (sīn-thēt'īk) **hair dyes**: hair dyes produced by artificial synthesis.
- system** (sīs'tēm): the whole body organism.
- systemic** (sīs-tēm'īk): pertaining to the general system or body as a whole.
- systole** (sīs'tō-lē): the period of the heart's contraction.
- tactile** (tāk'tīl): of or pertaining to the organs or the sense of touch.
- tapotement** (tā'pōt'mān'): percussion, as used in massage.
- temporal** (tēm'pō-rāl): of or pertaining to the temples. **t. artery**: artery of the forehead. **t. muscle**: muscle of mastication. **t. nerve**: that which affects the skin over the temporal muscle.
- tendon** (tēn'dūn): a fibrous cord of connective tissue by which a muscle is attached to a bone.

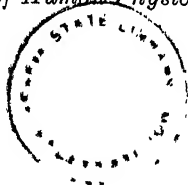
- tension** (tĕn'shŭn): the act of stretching or tensing.
- terminal** (tŭr'mĭ-năl): extremity or terminus. **t. artery**: an artery which terminates directly in capillaries, which does not branch.
- t. hair**: the hair of adult life.
- texture** (tĕks'tŭr): the structural order of the tissues and organs of the body.
- therapeutic** (thĕr''ā-pŭ'tĭk): of or pertaining to healing; curative.
- therapy** (thĕr''ā-pĭ): the treatment of disease. **hydrot.**: the use of water in the treatment of disease. **light t.**: the use of therapeutic lights for remedial purposes.
- thermal** (thŭr'măl): of or pertaining to heat.
- thoracic** (thō-răś'ĭk): of or pertaining to the thorax. **t. duct**: the main trunk of the lymphatic system.
- thorax** (thō'răks): the chest.
- tincture** (tĭnk'tŭr): a solution containing medical substances, usually prepared with alcohol.
- tinea** (tĭn'ĕ-ă): ringworm. **t. sycosis** (sĭ-kō'sĭs): a disease of the bearded parts of the face and neck caused by one of the trichophyton fungi; barber's itch.
- tissue** (tĭsh'ŭ): a mass of cells of the same kind united in the performance of a particular function.
- toxic** (tōk'sĭk): poisonous.
- traction** (trăk'shŭn): the act of drawing.
- tragi** (tră'jĭ): the hair of the ears.
- transitional** (trăn-sĭzh'ŭn-ăl): passing from one state to another, as *transitional hair*.
- transparent** (trăns-păr'ĕnt): permitting the passage of rays of light.
- transverse** (trăns-vŭrs'): lying crosswise. **t. facial artery**: the artery of the skin, the parotid gland, and the masseter muscle.
- trapezium** (tră-pĕ'zĭ-ŭm): the bone of the carpus.
- trapezius** (-ŭs): the muscle of the neck.
- trapezoid** (trăp'ĕ-zoid): the bone of the carpus.
- triangularis** (trĭ-ăn''gŭ-lă'rĭs): the muscle of the mouth; same as *depressor anguli oris*.
- triceps brachii** (trĭ'sĕps brăk'ĭ-ĭ): the muscle of the arm and forearm.
- trichology** (trĭ-kŏl'ŏ-jĭ): the sum of knowledge regarding the hair.
- trichophyton** (trĭ-kŏf'ĭ-tŏn): a fungus causing disease of the skin and hair.
- trichophytosis** (-tŏ'sĭs): disease of the skin and hair caused by the presence of trichophyton.
- trichorrhexis nodosa** (trĭk''ŏr-rĕk'sĭs nŏ-dŏs'ă): a dry, brittle condition of the hair marked by nodes along the shaft.
- trichosis** (trĭ-kŏ'sĭs): any disease of the hair.

- trifacial** (trī-fā'shāl) **nerve**: the fifth cranial nerve.
- trigeminal** (trī-jēm'ī-nāl): same as *trifacial*; the fifth cranial nerve.
- tubercule** (tū'bēr-k'l): any small, solid elevation of the skin.
- tumor** (tū'mēr): an abnormal swelling; an enlargement.
- turbinated** (tūr'bī-nāt'ēd): shaped like a top.
- tweeze** (twēz): to extract; to draw out.
- ulcer** (ŭl'sēr): an open sore other than a wound.
- ulna** (ŭl'nā): bone of the forearm.
- ulnar** (ŭl'nār): pertaining to the ulna. **u. artery**: that of the forearm. **u. nerve**: the nerve of the arm and hand.
- unciform** (ŭn'cī-fōrm): the bone of the carpus.
- uridrosis** (ŭ'rī-drō'sīs): the presence of urinous materials in the sweat.
- urticaria** (ŭr'tī-kā'rī-ā): an inflammatory disease of the skin; nettle rash; hives.
- vagus** (vā'gūs): the tenth cranial nerve; same as *pneumogastric*.
- vapor** (vā'pēr) steam; gas; smoke; any substance in the air visible to the eye.
- vascular** (vās'kū-lār): of or pertaining to vessels for carrying a fluid.
- vascularity** (-lār'ī-tī): the condition of being vascular.
- vaso-** (vās'ō): signifying the vessels of an organism. **v. constrictor** (kōn-strīk'tēr): causing constriction of the blood vessels. **v. dilator** (dī-lā'tēr): causing dilation or relaxation of the blood vessels. **vasomotor**: controlling the expansion and contraction of the blood vessels.
- vein** (vān): a vessel that conveys blood to or toward the heart.
- venae cavae** (vē'nē kā'vē): veins by which the blood is returned to the right auricle of the heart.
- venous** (vē'nūs): of or pertaining to the veins.
- ventricle** (vēn'trī-k'l): one of the chambers of the heart.
- venule** (vēn'ul): a small vein.
- verruca** (vē-rōō'kā): a wart.
- vertebra** (vūr'tē-brā): one of the bones of the spinal column.
- vertebrate** (-brāt): having a backbone or spinal column.
- vertex** (vūr'tēks): the crown of the head.
- vesicle** (vēs'ī-k'l): a cavity or sac containing liquid.
- vessel** (vēs'ēl): any tube or canal for conveying a fluid, such as the blood and lymph vessels.
- vibrissa** (vī-bris'ā): the hair of the nostrils.
- virulent** (vīr'ōō-lēnt): very poisonous; deadly.
- visceral** (vis'ēr-āl): pertaining to the internal organs: the heart, lungs, liver, and others.

- viscid** (vis'íd): sticky; glutinous.
- vitiligo** (vít''í-lí'gō): a skin disease characterized by white patches.
- volatile** (völ'â-tíl): having the tendency to evaporate rapidly.
- volt** (völt): the unit of electromotive force.
- voluntary** (völ'ün-tā-rí): produced by an act of the will.
- vomer** (võ'mēr): bone of the nasal cavity.
- vulnerable** (vül'nēr-â-b'l): susceptible to injury or contagion.
- wart** (wôrt): an elevation of the skin formed by a hardening of the papillae; verruca.
- watt** (wõt): the unit of electric power.
- wen** (wěn): a sebaceous cyst.
- wheal** (hwēl): an elevation on the skin, such as that produced by the bite of an insect or the stroke of a whip.
- witch hazel** (wích hā'z'l): hamamelis; an extract of the bark of a plant used as a remedy for bruises and sprains and in the manufacture of skin-toning lotions.
- wrinkle** (rín'k'l): a crease or furrow, such as a wrinkle of the skin.
- zygomatic** (zī''gō''măt'ík) **nerve**: that which affects the muscles of the orbit.
- zygomaticus** (-cūs), **major and minor**: muscles of the upper lip.

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